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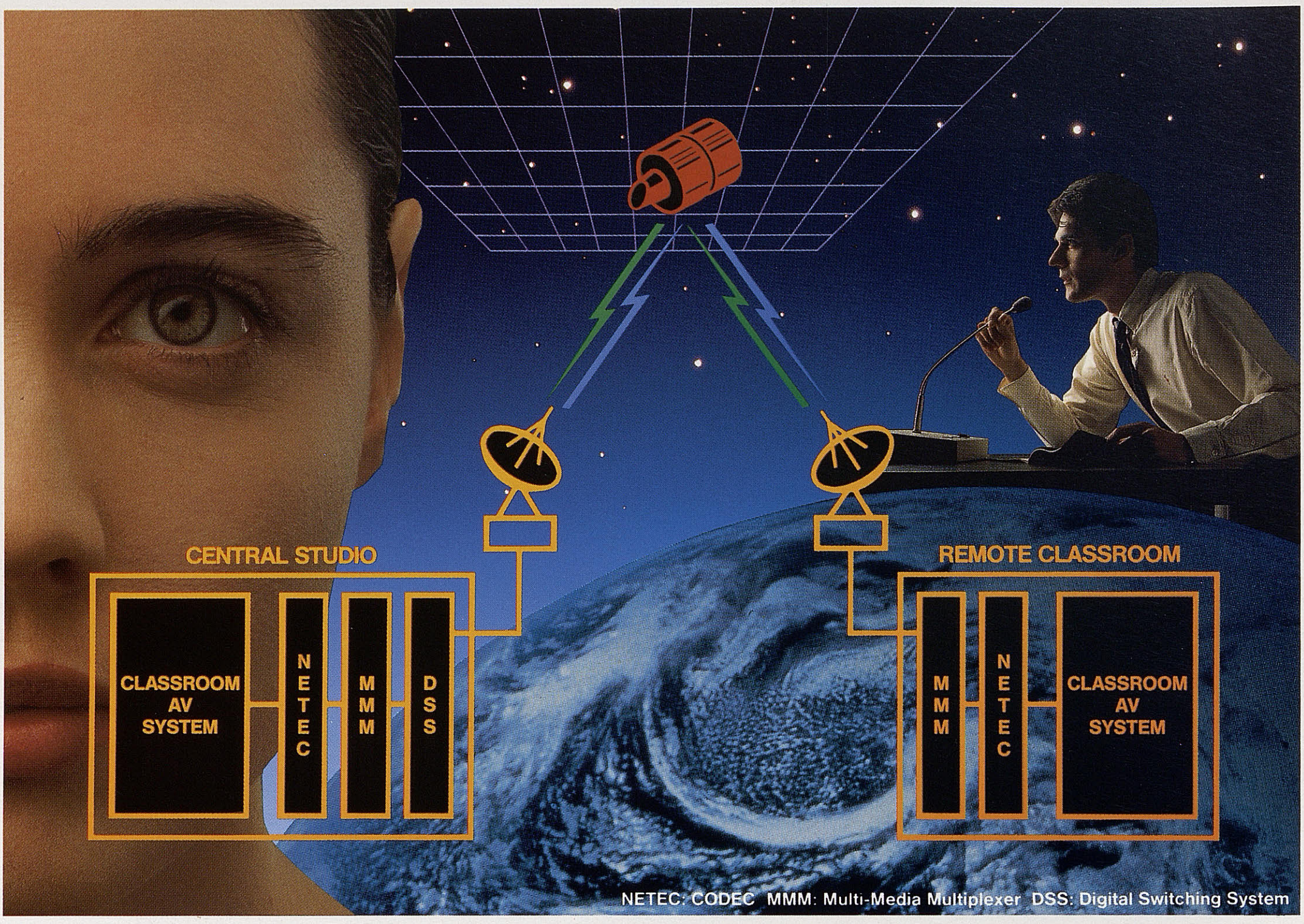
Nice, 23 May – 29 June 1989

ISSN 0497-137X

NEC NEWSCOPE



TELE-EDUCATION VIA SATELLITE NETWORK: INTERACTIVE VIDEO AND AUDIO.

NEC is operating one of the world's most advanced satellite-based tele-education systems. Called NESPAC (NEC Satellite Pedagogical Network for Advanced Creative Education), the system links a central studio at the NEC Technical College near Tokyo with three other classrooms in remote locations across Japan.

The most prominent feature of NESPAC is interactive video and audio communication between lecturer and students. The system can simultaneously transmit and receive two channels of color motion video signals, as well as one channel of audio and data signals from an electronic writing board.

For economical use of the satellite circuit, a NETEC series video codec digitizes and compresses video and audio signals to 1.544Mbps. It also scrambles the signals to ensure information privacy. An AEC-700 echo canceller efficiently suppresses the echoes caused by satellite communication.

The NESPAC system offers a panorama of C&C technology. From the camera to the satellite transponder, from the earth station equipment to the 100-inch video projector, virtually all elements of the system are NEC products.

NEC is a leader in long-distance education systems using communications media including public telephone networks, terrestrial microwave systems, CATV fiber optic cables and satellites.

NUMBER 141

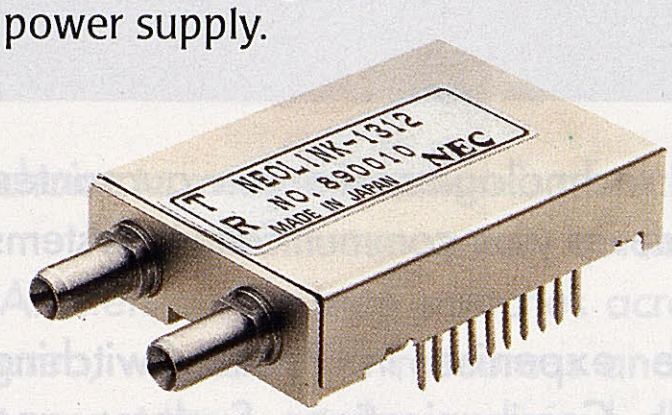
FDDI FIBER OPTIC TRANSCEIVER.

The American National Standard Institute (ANSI) is now compiling the standard for high-speed LANs. Called the Fiber Distributed Data Interface (FDDI), the new standard features a data rate of 125Mbps, 100km network coverage and up to 500 nodes.

NEC's NEOLINK-1312 is designed to meet or exceed FDDI-PMD requirements. The new 125Mbps fiber optic transceiver incorporates a 1.3μm LED, PIN-PD and two LSIs. These are the same components used in our 200Mbps datalinks (NEOLINK-2012). Over 60,000 pairs of the 200Mbps link have been shipped since 1985 without a single field failure.

The new NEOLINK-1312 features a transceiver configuration designed for easier mating with an MIC duplex connector. The design eliminates the need to painstakingly align separate transmitter and receiver units on a printed wiring board. Crosstalk and noise problems are also solved with our circuit and isolation expertise.

The NEOLINK-1312 offers an average output power of –16dBm; average receiving power between –34.5 and –13.0dBm. It operates on either a single +5V or –5.2V power supply.



NEW SOLID-STATE TV TRANSMITTERS: UP TO 40KW IN UHF.

Solid-state TV transmitters are fast replacing tube types because they are more reliable, economical and easier to maintain.

The all solid-state transmitters of NEC's new PCU-900 series incorporate the latest semiconductor and RF circuit technologies. We offer five models for UHF broadcasting: 5/10/20/30 and 40kW.

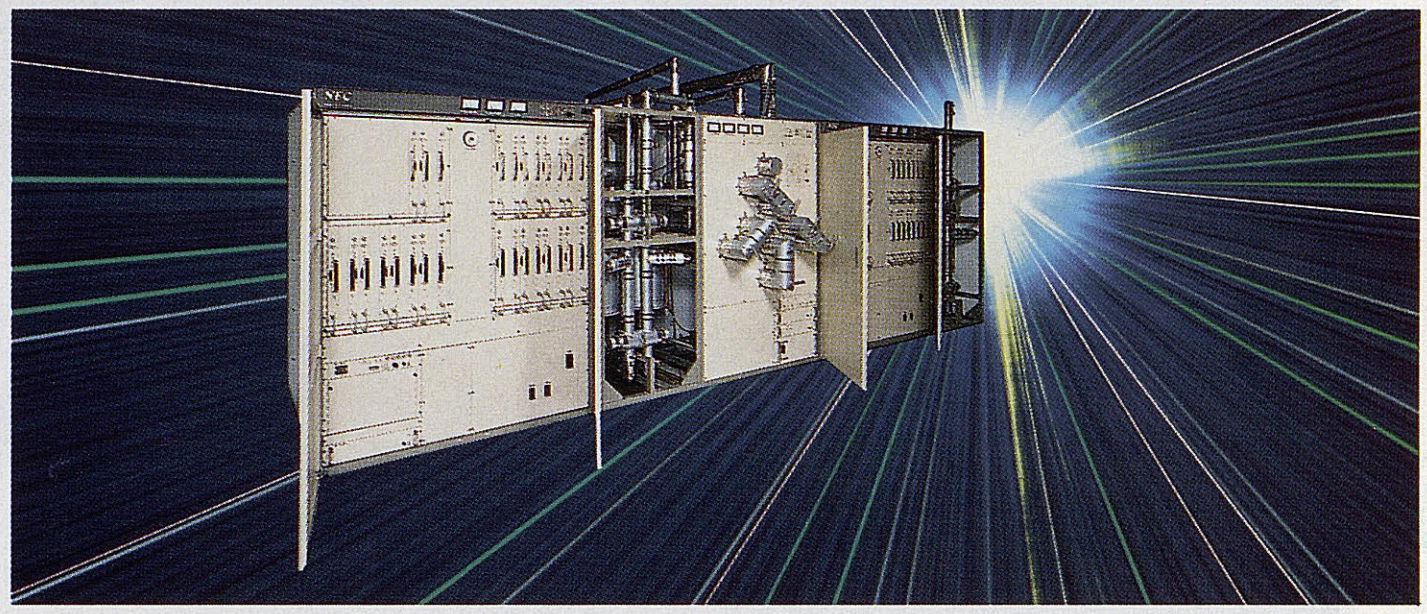
All models use 800W PA modules and 110W power transistors specially developed by NEC.

All adjustments are handled automatically by a high-performance synthesized exciter.

Reliability is enhanced by parallel use of power transistors and PA modules. Increased stability handles voltage fluctuations of ±10% without AVR.

Since the transmitters operate on 28V DC power, they provide greater safety and require less maintenance. Power transistors are efficiently cooled by our "Jet Air Cooling" system.

NEC also supplies a series of fully solid-state transmitters for VHF broadcasting. Our PCN-1400 series has five models: 5/10/15/20 and 30kW.



VAST LIBRARY SYSTEM FOR CHINA.

NEC is supplying a large-scale information system to the National Library of China (NLC) in Beijing. With over 14 million volumes in its collection, the NLC is one of the world's largest libraries.

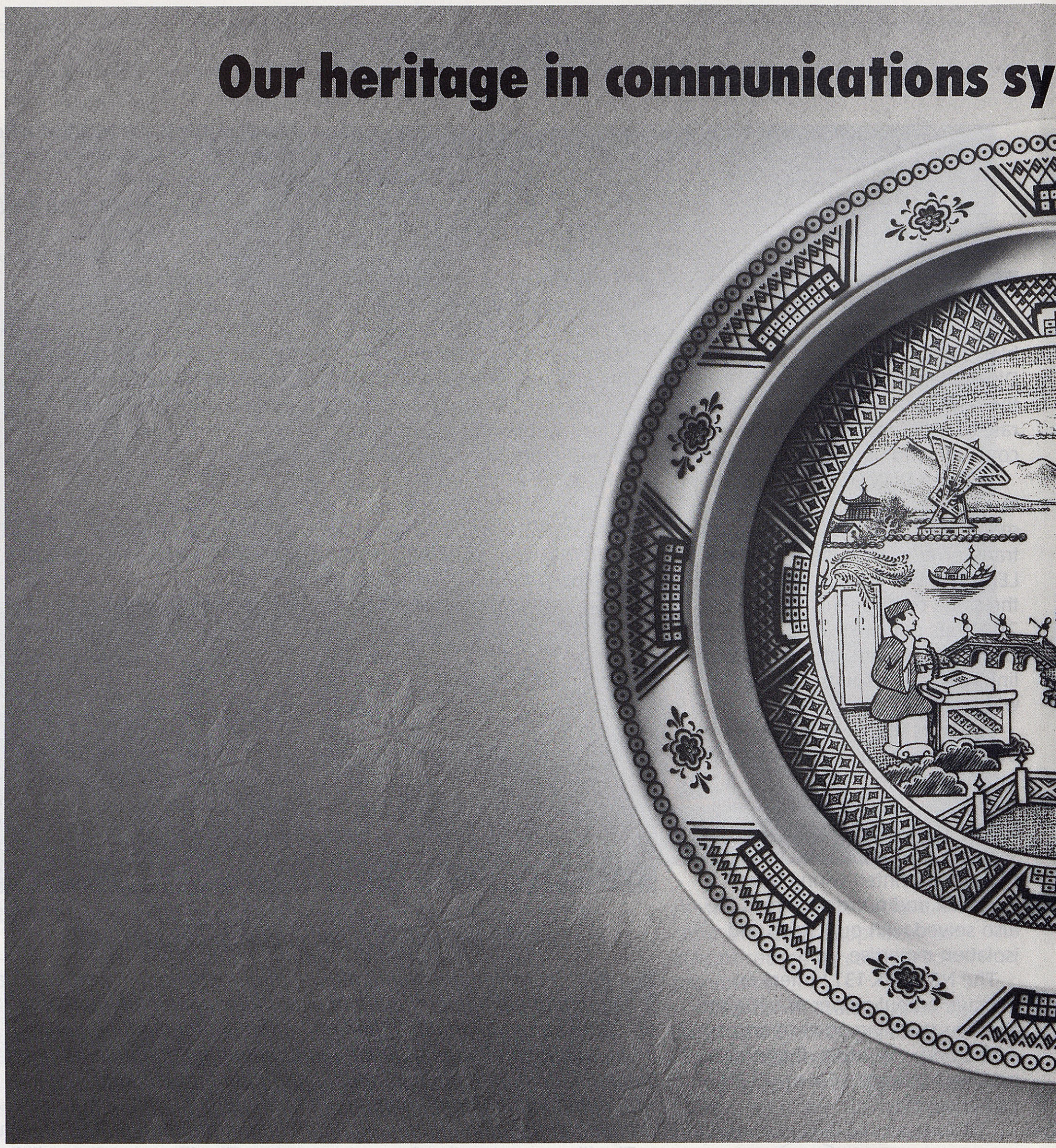
The library system for the People's Republic of China consists of two mainframes for database management and 270 personal computers for terminal applications. The system will handle 56 languages and allow retrieval of millions of books in each language by category and author listing.

The NLC and NEC are jointly developing Chinese-language software for the system. The software will meet China's new national standard of 32,000 characters. The library system will be in full-scale operation in mid-1991.

Since the NLC is one of China's academic centers, it will use the system in the future as the core of a network linking thousands of libraries around the country.

NEC

Our heritage in communications sy



As specialists in communications systems, Alcatel is quite simply the leading force across the broad spectrum of Public Network Systems, Transmission, Business Systems, Cables and Network Engineering and Installation.

Because Alcatel covers such a wide range of complementary technologies, we can guarantee full support, whatever your communications systems requirements.

Our unique expertise in Public Switching Systems, Private Communications Systems and Transmission Networks made Alcatel the obvious

stems has made its mark on China.

choice to meet the demands of such a huge market.

As the Chinese were quick to appreciate, Alcatel's experience stretches across such a wide area, we have the resources and the confidence to meet the most demanding challenge anywhere on or above this planet.

ALCATEL

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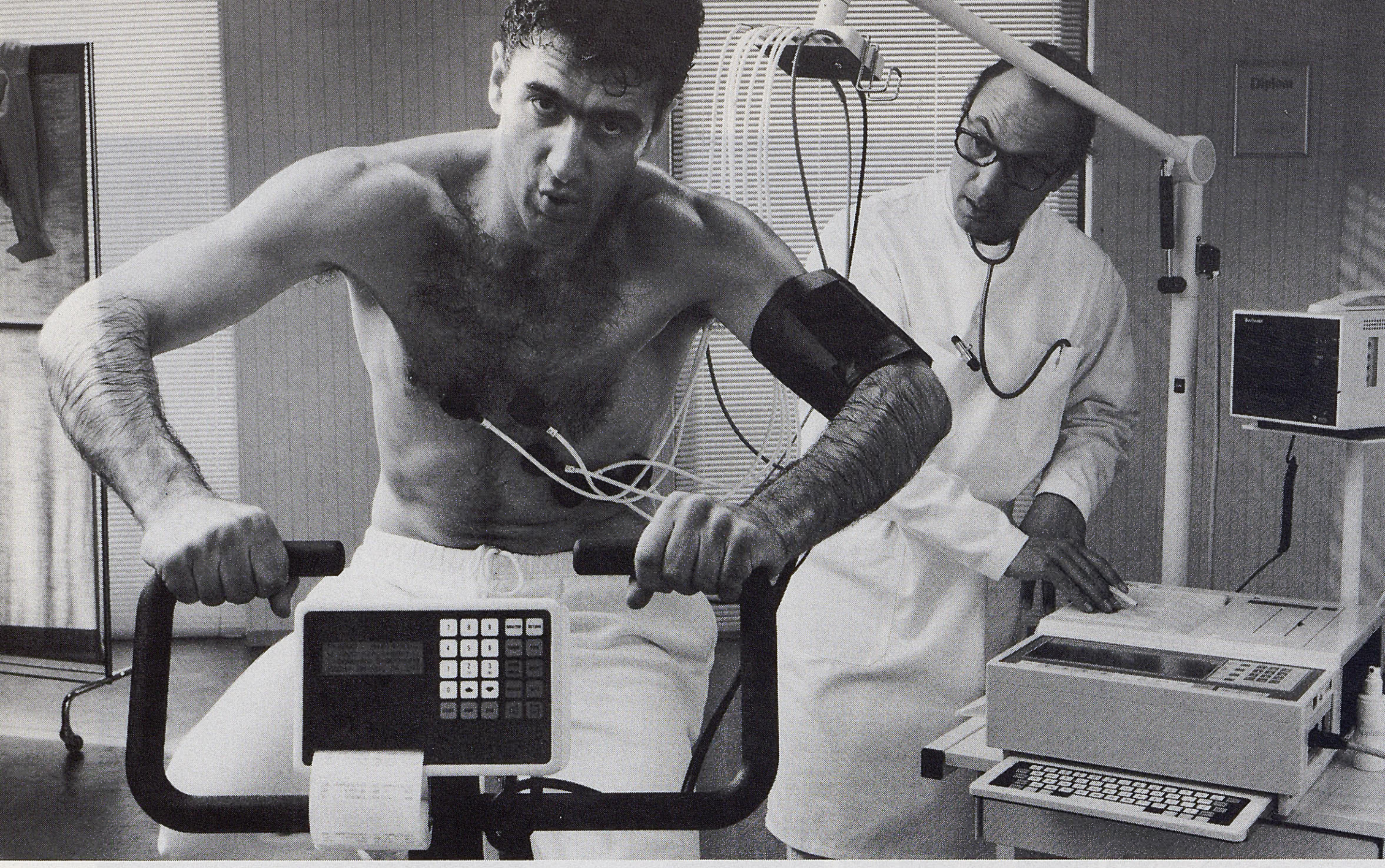

Stress it, then test it. That's how our new ICS and PCS call simulators for ISDN exchanges work.

A workout is part of every physical checkup. This is essential for certain diagnoses. The same rule applies to digital exchanges: you can't genuinely identify problems unless you simulate a traffic load. That's why STR designed the new ICS and PCS call simulators.

Their underlying technology is identical. The two models differ only in terms of application: the ICS is connected to BA, the PCS to PRA interfaces. And apart from ISDN exchanges, they will also test multiplexers, concentrators and PABXs.

Both call simulators are effective and easy to use. No software knowledge is needed making programming quick and simple. The operator can therefore concentrate on the test procedure.

The ICS and PCS units are universal: they can be used for the installation of exchanges but also provide flexible test capabilities in development labs.

Both test systems are almost as indispensable for ISDN systems as physicians for people.

If you would like more information, please contact: Standard Telephon und Radio AG, CH-8055 Zurich, Friesenbergstrasse 75, Switzerland or ALCATEL-STR c/o Alcatel North Asia Pacific Ltd, Hongkong, East Point Centre, 15th floor, 555 Hennessy Road or ALCATEL-STR Representative Office North America, Westport CT 06880, 191, Post Road West.

Please send me detailed documentation on the ☐ ICS ☐ PCS.

Name _____

Company _____

Address _____

_____

Telephone _____ Telefax _____

U.I.T.

Standard Telephon und Radio AG, CH-8055 Zurich, Friesenbergstrasse 75, Switzerland

ALCATEL
STR

Dr. Juchli 925 STR

Optical Fibre Communications

In 1966 two STC engineers were first to demonstrate communication through optical fibre, an innovation which was to change the future of telecommunications.

Today, STC's optical systems allow public network operators the opportunity to offer more services, quickly with network control and at low cost. These benefits are available with systems used in either the main network or as an overlay to existing networks in key geographical locations.

STC First With The Future

For your information pack, simply contact
Lynda Stoker at STC Telecommunications,
Oakleigh Road South, New Southgate,
London N11 1HB
Telephone: 01 368 1234 Telex: 21917 STC NS G
International Telephone: +44 1 368 1234

STC TELECOMMUNICATIONS

PIONEERS IN MEASUREMENT

Sizing Up the Earth in 200 B.C.

Eratosthenes believed the earth was round. As director of the great library at Alexandria in Egypt, he decided to go beyond abstract argument and actually measure it to back up the argument.

Eratosthenes

Knowing that the midsummer noon sun shone straight down a vertical well in Syene far to the south, he measured the slight angle of the sun's shadow in Alexandria on the same day. He figured the distance between the two cities by how long it took a camel to walk there. Then, with a little simple geometry, Eratosthenes came up with fairly accurate figures for the earth's circumference and radius. His pioneering measurement made a significant impact on history.

Communications Support for 2000 A.D.

Today, Anritsu's pioneering efforts in communications measurement are also paying off. Anritsu has long been a leader in the most sophisticated measuring methods, and continues to reach new levels of accuracy. The complex technologies behind modern multiplex techniques, for example, demand the highest degrees of precision. That's why carriers and manufacturers alike turn to Anritsu for the answers when it comes to accurate measuring and test equipment for communications.

Anritsu continues the pioneering tradition in measurement.

MP1601A 5GHz Pulse Pattern Generator

Anritsu

ANRITSU CORPORATION
10-27, Minamiazabu 5-chome, Minato-ku, Tokyo 106, Japan
Phone: Tokyo 03-446-1111, Telex: 0-242-2353 ANRITU J

If water was as clear as our optical fibres, he wouldn't need a lamp.

ANT 8902 E O & M F

To carry information for miles underground, optical fibre cable must be capable of conveying light signals with as few losses as possible.
That's why they're made of high purity silica. But it's also thanks to ANT state-of-the-art technology that signals sent by powerful semiconductor lasers can be also detected correctly at the other end. ANT brings a message of light through glass clearer than water.

Optical fibre cable production at the ANT plant in the Rhine valley.

ANT Nachrichtentechnik GmbH
Gerberstr. 33, D-7150 Backnang
Tel.: West Germany (7191) 130

ANT
Telecommunications

The decision that paid off: 100 000 000 phonecards.

Landis & Gyr's Telephony division is pleased to announce that their decision to develop card operated payphones and to pioneer optically coded cards has proved to be an unqualified success.

To date, 100 000 000 Phonecards have been sold worldwide, confirming Landis & Gyr's position as leaders in the field of optically coded phonecards.

We would like to use this occasion to thank all our customers whose confidence and co-operation made a major contribution towards the success of the "Phonecard".

Payphone technology-a touch friendlier

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Tx. 418 341
Fax: 202 82 38 00

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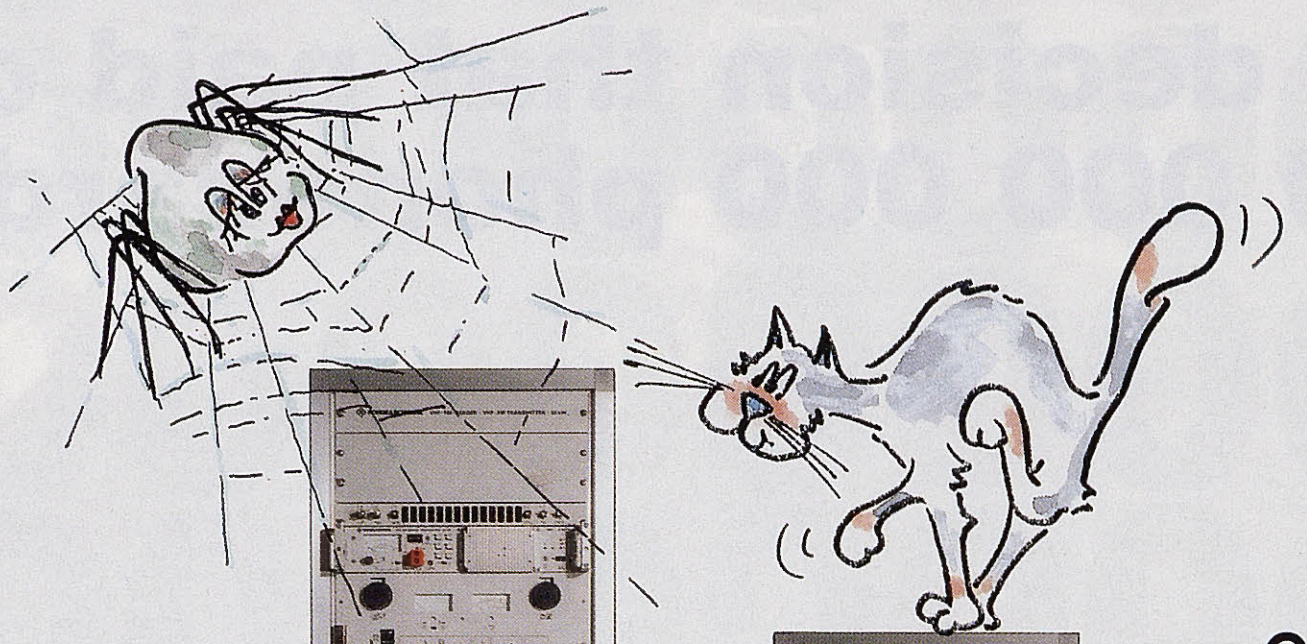
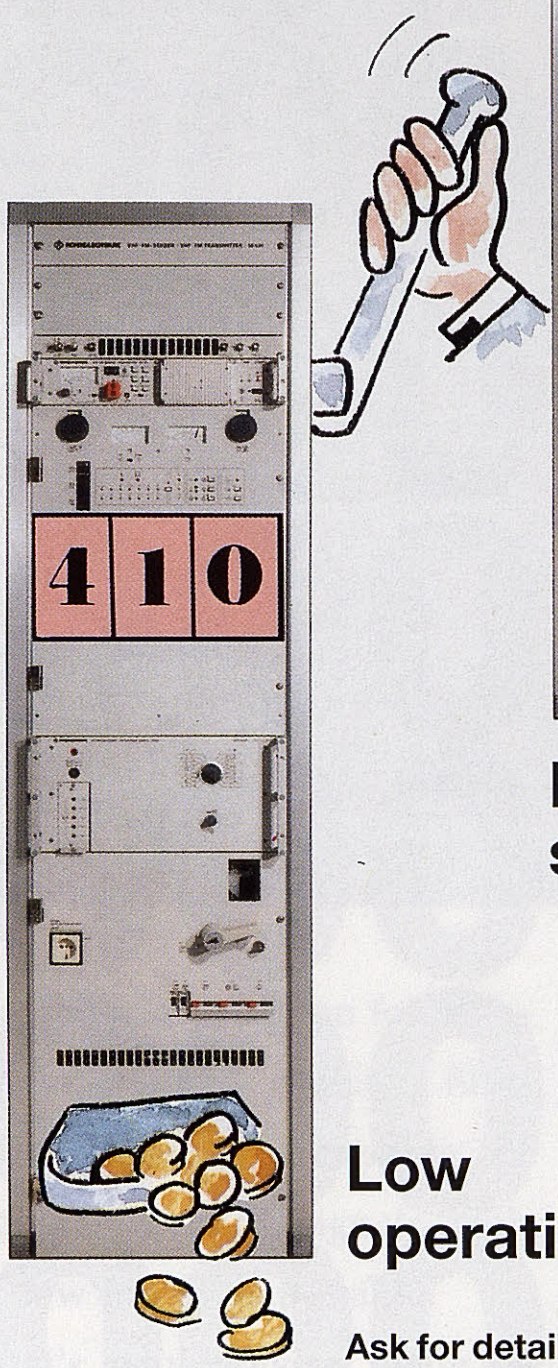
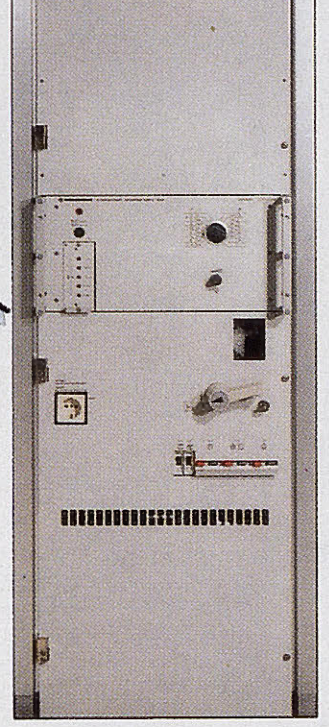
70, Grand-Pré,
CH-1211 Geneva 16
Tel. 022 / 733 55 00,
Tx. 751 703 ch,
Fax 022 / 733 52 19

LANDIS & GYR

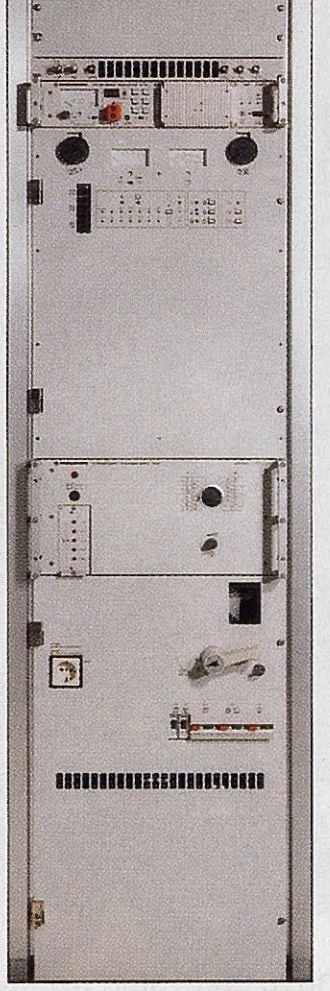
The new generation of FM transmitters





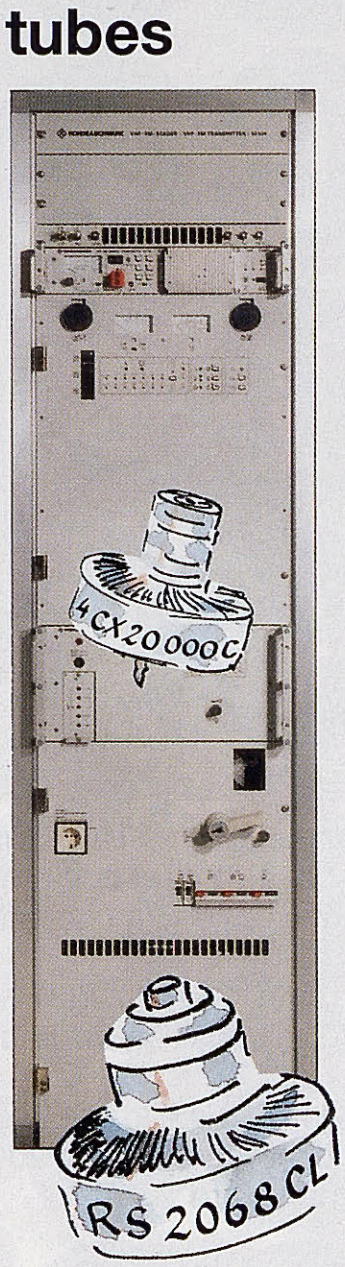


Extremely long service life



Quiet operation

Choice of tubes



Low operating costs

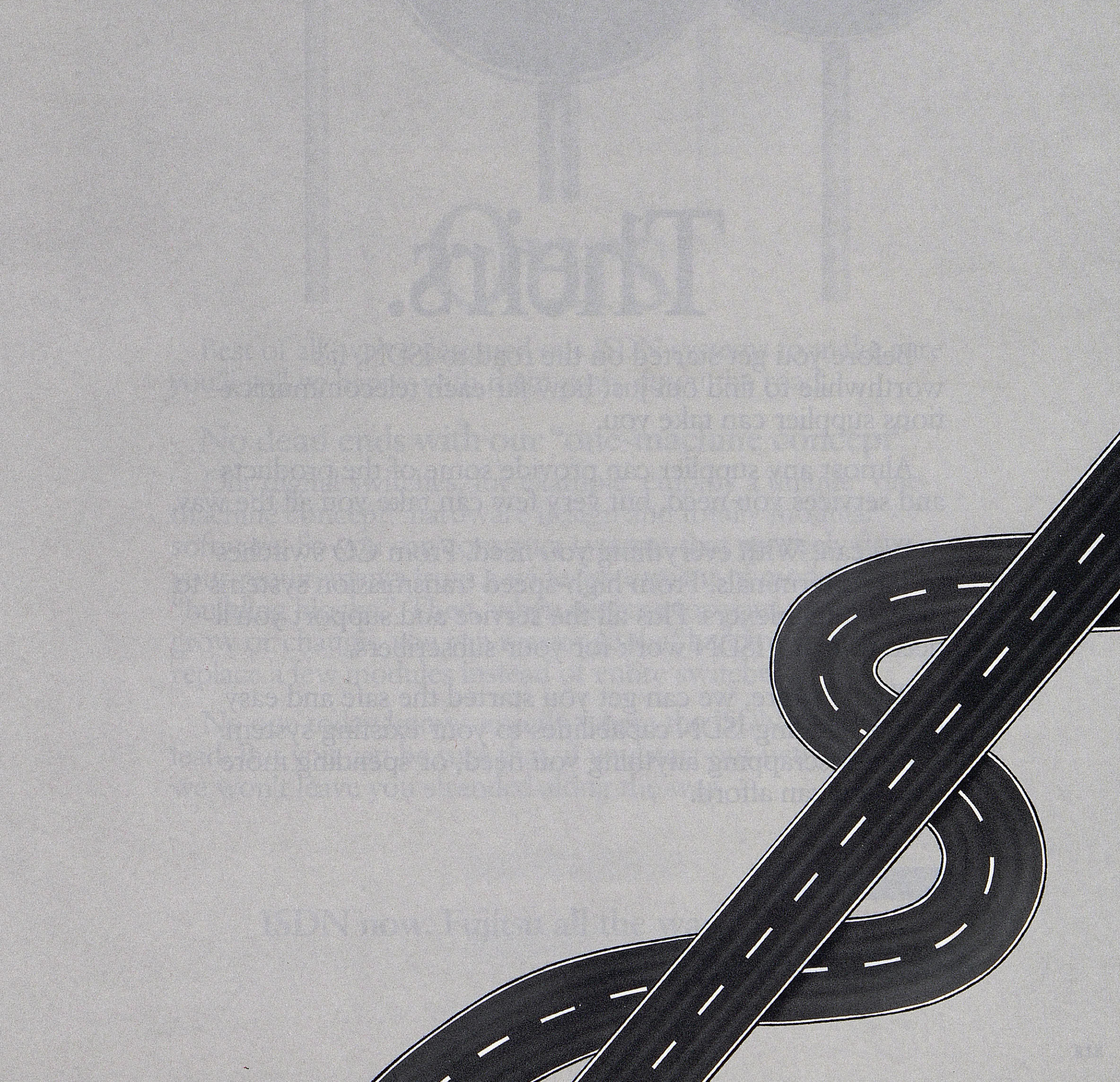
Ask for detailed information on the new VHF FM Transmitter Series NR 410 R1

1000 Berlin Ruf (0 30) 3 41 40 36
2000 Hamburg Ruf (0 40) 6 30 70 46
5000 Köln Ruf (0 22 03) 2 10 46
6078 Neu-Isenburg Ruf (0 61 02) 3 30 36
7500 Karlsruhe Ruf (07 21) 3 49 51
8000 München Ruf (0 89) 40 30 73
8500 Nürnberg Ruf (09 11) 8 67 47

ROHDE&SCHWARZ

F-FM E

Two routes ISDN systems can take for future growth...



Theirs.

Before you get started on the road to ISDN, it's worthwhile to find out just how far each telecommunications supplier can take you.

Almost any supplier can provide some of the products and services you need, but very few can take you all the way.

We can. With everything you need. From CO switches to ISDN terminals. From high-speed transmission systems to digital multiplexers. Plus all the service and support you'll need to make ISDN work for your subscribers.

What's more, we can get you started the safe and easy way, by adding ISDN capabilities to your existing system. Without scrapping anything you need, or spending more than you can afford.

Ours.

Best of all, we've designed our ISDN systems to make sure you'll still be happy with them years down the road.

No dead ends with our "one-machine concept"

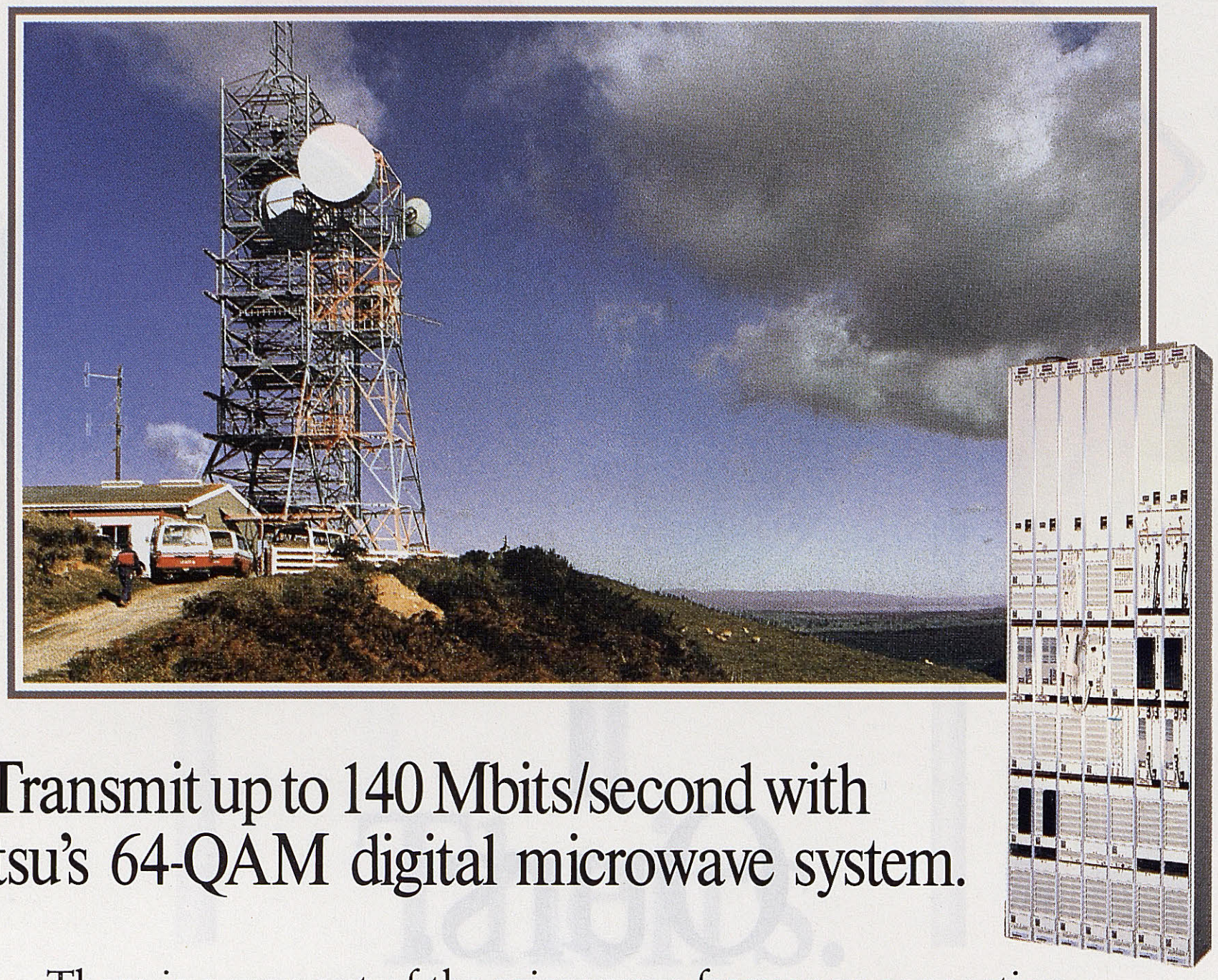
Our digital switches, for example, employ a unique "one-machine concept" hardware design and totally modular software. So you can construct systems that precisely fit your requirements from a wide assortment of modular "building blocks." Then, when it's time for your system to grow or change, you can rearrange the "building blocks" or replace a few modules instead of entire switches.

No one today knows exactly where the ISDN road will lead. But you can be sure that, if you start out with Fujitsu, we won't leave you stranded along the way.

ISDN now. Fujitsu all the way.

FUJITSU

Prevent telephone traffic jams.



Transmit up to 140 Mbits/second with Fujitsu's 64-QAM digital microwave system.

There is a way out of the microwave frequency congestion problem. It's the 64-state Quadrature Amplitude Modulation digital microwave transmission system from Fujitsu.

Available in both CEPT (30 CH) and North American (24 CH) hierarchies, it's the next logical step up from 4-PSK or 16-QAM systems — and an important step toward ISDN.

State-of-the-art Fujitsu GaAs power FETs give our 4, 6, 8, and 11GHz 64-QAM systems remarkable linearity and extremely low power consumption. And, since hitless switching means superior reliability, your acquisition costs are surprisingly low.

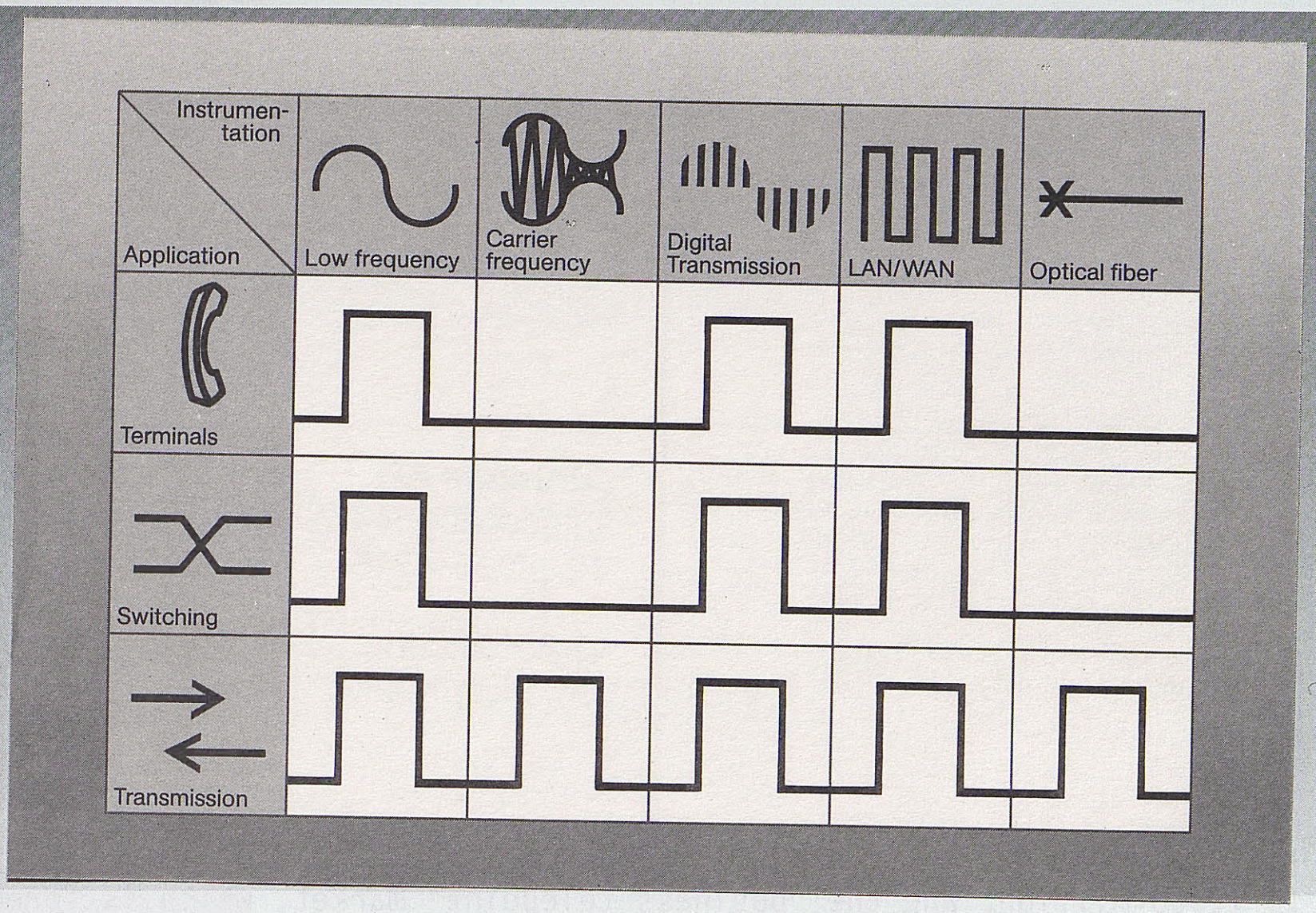
If you're looking for a way out of the microwave frequency traffic jam — and a way into the digital world of ISDN — it's time to talk to Fujitsu.

FUJITSU

ISDN now. Fujitsu all the way.

SIEMENS

Secure Communications



Communications–measuring equipment from Siemens

Our task at Siemens is to make communications work–anytime anywhere–by providing and continuously developing the technical basis required.

Communications measuring equipment is used to ensure the efficient function of communication systems. It supports research, development and production; secures communication lines and equipment and also ensures the economical operation of your network.

Systems engineers and measurement staff work hand in hand. This benefits both our measuring instruments, and of course, our customers.

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☐ The areas marked above are of particular interest to me.

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CeBIT Report

Telecommunications

* **Hannover Fair CeBIT '90 to be extended by 20,000 sq. m.:** Deutsche Messe AG, the organizers of Hannover Fair CeBIT, have announced that the net display area at CeBIT '90 will be increased by 20,000 square metres to a total of 250,000 square metres. This decision has been taken in response to the increased demand for exhibition space, in particular among foreign exhibitors of telecommunications technology and computer-aided techniques (CAD/CAM and CIM). CeBIT '89 attracted 510,000 professionals, including top managers from all over the world.

* **Supreme Court to decide who controls Canadian telecoms industry:** A Supreme Court of Canada decision expected in the next few days should put an end to the long drawn-out struggle to achieve a national telecommunications policy. In effect, the Court will rule on the crucial question of which level of government (federal, provincial or municipal) should be responsible for the CDN$ 10 billion industry. This truly watershed decision stems from the case of CNCP Telecommunications of Toronto, which is seeking to offer a full range of national telecommunications services (including public long-distance) against the state-owned Alberta Government Telephones, which is striving to maintain its monopoly in Alberta.

* **Rapid growth of European market for cordless telephones:** The market for cordless telephones in Europe will top ECU 3 billion by 1995 and could even reach ECU 4.5 billion. This was announced by the EC Commission in Brussels. It predicts the development of three distinct market sectors: "cordless PABXs" for use in offices, which should account for an annual market of ECU 1,000 million; domestic cordless telephones, a market valued at ECU 1,000 to 1,500 million; and the "business telepoint" market, which is forecast to be worth an additional ECU 1,000 to 1,500 million.

* **USA appointed Partner Country for CeBIT '90:** Hannover Fair CeBIT officials have announced that the United States of America will be the Partner Country at CeBIT '90 (21st - 28th March). This was mutually agreed between the US Department of Commerce, Washington, the Foreign Commercial Service of the US Embassy in Bonn and DEUTSCHE MESSE AG, Hannover. The German and European information and telecommunications industries are very interested in intensifying contacts with the U.S. as well as in exploring opportunities for further economic and technological co-operation. There is equally strong interest on the part of the US business community in working with European and German firms and organizations in preparation for the Single European Market after 1992.

Deutsche Messe AG, Messegelände, D-3000 Hannover 82, Telephone (5 11) 89-1, Telex 9 22 728

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(since 1934)
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Cover:

The Acropolis in Nice where the ITU Plenipotentiary Conference is meeting from 23 May to 29 June 1989

(ITU)

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GENERAL: articles, reports and other texts submitted for publication in the *Telecommunication Journal* should be typed in double spacing and with a wide margin. Diagrams should be submitted in indian ink and photographs on glossy paper or in the form of colour transparencies. Articles should be accompanied by a photograph of the author and a short description of his post and current duties (maximum 60 words). They should be sent to: "The Editor-in-Chief, Telecommunication Journal, International Telecommunications Union, Place des Nations, CH-1211 Genève 20 (Switzerland)".

SCOPE: the Editorial Board will consider articles in all branches of telecommunications with emphasis on their world-wide or international interest. Articles on telecommunication policy, regulatory, legal, economic or social aspects of telecommunications are especially welcome. Articles containing overt publicity will not be accepted.

LANGUAGES: articles may be submitted in any of the three working languages of the Union, i.e. English, French or Spanish. Should it be in any other language, both the original and a translation in any of these three languages should be submitted.

TITLE: it should be brief, specific and as informative as possible.

ABSTRACT: each article should be accompanied by a 100-200-word abstract which should be a summary (not an introduction) and suitable for separate publication.

TEXT: articles should normally have a length of 2500-5000 words. They should be written concisely in a style which can be understood by the non-specialist. Abbreviations should be explained and conclusions clearly stated and illustrated with graphs, diagrams and/or photographs where necessary.

MATHEMATICS: only a minimum of mathematics should be included in the text. Detailed mathematical treatment, if necessary, should be given in an appendix. In such cases all equations and formulas should be written clearly and numbered at the right-hand side of the page. Superscripts and subscripts should be placed accurately; avoid superscripts that may be confused with exponents.

UNITS: the units of the *Système international* (SI), together with the standard symbols recommended by the International Organization for Standardization (ISO) should be used.

REFERENCES: references should be listed at the end of the article avoiding references to unpublished documents. They should be given in the following order: author (surname first); title of the article or book (original language); title of the journal or name of publisher; date; volume; number; pages. For example: Eden H.: Sound broadcasting coverage and frequency planning in the LFD/MF bands, *Telecommunication Journal,* June 1972, Vol. 39, No. VI, pages 352-364.

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Towards the information age

It is commonplace these days to talk about the information age. So much so that we may often not stop to think just what that term really means. In fact it seems to mean different things to different people.

For some the information age started with the marriage of computers and communications, a marriage of great mutual benefit to both parties. The use of computer techniques in switching, transmission, network management, network planning and maintenance, to cite only a few applications, has permitted major advances in telecommunication services, whilst the possibility for computers to communicate between one another has added a new dimension to data processing. An essential ingredient contributing to the health and growth of both industries is the rapid introduction of digitization throughout the world.

For the user, the information age signifies the availability of efficient, reliable and affordable communication and information services. In the great commercial centres of the world, the data and information networks of banks, stockbrokers, airline and tourism services and modern businesses are evidence of the information age already at work. In the industrialized countries, the telephone is close to becoming a standard piece of household equipment to which is now being added videotex information systems and value-added services such as teleshopping, security systems and electronic mail.

But while we may marvel greatly at these innovations, let us not forget that, even in the industrialized countries, the majority of the population has no easy access to all these new services. As to the developing countries, there are still millions of people who live without any kind of telecommunications whatsoever. Until such people can be given access to basic telecommunication service and the economic and social benefits which stem from it, we cannot truly speak of our entering the information age.

In its report *The missing link*, the Independent Commission for World Wide Telecommunications Development focussed attention on the distressing disparity in the distribution of telecommunications and stated "Neither in the name of common humanity nor on grounds of common interest is such a disparity acceptable". In order to remedy this situation, the Commission set this overriding objective: "... by the early part of the next century virtually the whole of mankind should be brought within easy reach of a telephone and, in due course, the other services telecommunications can provide", and made a set of wide-ranging recommendations for achieving this objective. The need for a substantially increased rate of investment in the telecommunication sector in developing countries and measures to mobilize and transfer resources for this purpose were among the key recommendations.

The Independent Commission also noted that irrespective of whether telecommunications are publicly or privately owned and whether competition is encouraged or not, they should always be run on sound business lines as a separate, financially self-sustaining organization. The application of this principle, which has recently been reiterated by the Advisory Group on Telecommunications Policy[1, 2], can only lead to a healthier financial situation and progressively to increased revenue surpluses for investment.

The establishment of a world-wide telecommunications infrastructure is not, however, the only prerequisite of the information age. An appropriate policy framework, management practices and human resources development are vital. Yet another essential requirement is interconnectivity which is primordial both for industrialized and developing countries to reap the full benefits of improved access to and transfer of information of all kinds.

And here, with the spreading of digitization, there is a new phenomenon—the attachment of personal computers to the basic telecommunication infrastructure. Innovators will find ways to use the basic telephone circuit to service their own practical needs, by using these devices as simply as they do the telephone. They are bound to establish their own interconnectivity arrangements in the same way as governments or business enterprises do, and take advantage of the significant opportunities of improved communications for their needs.

Nevertheless, to ensure an acceptable degree of interconnectivity for all —and the very term interconnectivity implies that everyone is concerned—appropriate regulation, standardization and development with a *world-wide* perspective will always be necessary.

As the United Nations Specialized Agency for telecommunications, the ITU has this basic responsibility: to serve as a global node for exchanging information and reaching agreement on a timely basis, for the interconnection and inter-operation of the world-wide information and communications electronic transport network.

In this context, it must be remembered that broadcasting is also a key communications resource for all countries. A major mass information medium, it is the only practical means of delivering information to whole populations including those living in the more isolated and remote areas of the world. A variety of terrestrial and satellite sound and television broadcasting services, including those such as teletext, etc., have a major contribution to make to the information age. Here critical regulatory aspects, such as interregional co-ordination and the use of spectrum efficient techniques can only be effective through world-wide agreement.

In conclusion, let me say how the increasing interdependence that is emerging between different fields of human endeavour evokes for me the sentiment of the poet John Donne when he wrote "No man is an island, entire of itself; every man is a piece of the continent, a part of the main". I am sure that modern telecommunications and the march towards the information age will make this a more tangible reality, thus promoting peace and prosperity among all nations and peoples.

R. E. BUTLER

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[1] See *Telecommunication Journal*, May 1989, pages 272-274.

[2] Advisory Group on Telecommunication Policy: *The changing telecommunication environment: policy considerations for the members of the ITU*. ITU, Geneva, February 1989.

Union Activities

Ninth meeting of the CTD Advisory Board

The ninth meeting of the Advisory Board of the Centre for Telecommunications Development (CTD) was held in Geneva on 4 and 5 April 1989. In the absence of the Chairman, Mr A. D. Ntagazwa, Mr N. J. M. Biezen, Vice-Chairman, presided over this last meeting of the Advisory Board before the 1989 Plenipotentiary Conference in Nice. A very full agenda was discussed which included, *inter alia*, approval of the 1989, 1990 and 1991 budgets, report on field activities and an addendum to the Advisory Board's report to the ITU Administrative Council.

In his opening statement, Mr R. E. Butler, Secretary-General of the ITU and Senior Vice-Chairman of the Board, stressed that the development function of the Union is expected to be on centre stage in the Plenipotentiary Conference debate, and thus there is a need for the Board to help set the stage for meaningful discussions and directives from the Conference.

The Executive Director, Mr D. Westendoerpf, presented the budget requirements which were approved. The 1989 budget includes funded activities for 3.3 million Swiss francs (CHF) in cash and 2 million in kind. The total budgets (including both cash and in kind) for 1990 and 1991 are 6 million and 8 million CHF, respectively.

The report on field activities given by Mr A. Laouyane, Deputy-Executive Director, indicated that the Centre is very active with field work. To date, the initial analysis has been completed on more than 40 requests out of 62. An identification mission to the beneficiary country, as part of the initial analysis, has been required for 18 of the 40. The completion of the analysis has resulted in the definition of almost 30 projects and specific missions. Of the nearly 30 defined projects and specific missions, 22 have reached the implementation stage. In fact for eight of the 22, expert field work has been completed.

According to *The missing link* report, a minimum of 4 billion United States dollars (USD) per annum of additional investment is required to bring all mankind within easy reach of a telephone by the year 2000. The current estimate of our experts is that the end results of existing CTD projects and specific missions will yield about 200 million USD in additional communication networks investment in the beneficiary countries which is still a very small portion of the goal. At the request of the beneficiary, CTD plans to act as a catalyst to obtain resources for these investments.

The need for the Plenipotentiary Conference to address the Centre in the context of the ITU's development assistance role with a possibility of a more stable funding process was given attention by the Advisory Board.

Missing badges: call for help!...

A collection of various ITU conference badges, exhibited in a showcase at the entrance to the Union's headquarters, is shown on page 348. Our readers will see that some of those badges are missing. We appeal to delegates who participated in those conferences and who still have some of the missing badges to kindly send them to us at the following address: "Mr S. Larcher, International Telecommunication Union, Supplies and Stores, Place des Nations, CH-1211 Genève 20 (Switzerland)".

Missing badges: call for help!...

CCIR News

Meeting of Interim Working Party 11/5

A key element: protection ratio values for new television systems

At the kind invitation of the Italian Ministry of Posts and Telecommunications, Interim Working Party 11/5 (Protection ratios for colour television systems. Terrestrial services) met in Rome (Italy) from 7 to 10 March 1989, under the chairmanship of Mr S. Dinsel (Fed. Rep. of Germany).

On behalf of the Italian Administration, Mr C. Baudazzi, Head of the International Relations Office, welcomed the 13 participants.

The purpose of this meeting was to discuss protection ratio values for terrestrial television systems, in particular for high-definition television (HDTV). Protection ratio is a key element in frequency planning for broadcasting services and essential for the efficient use of the frequency spectrum.

In accordance with its terms of reference (Decision 42-3), the IWP should collect information and establish protection ratios applicable to new terrestrial television systems, including HDTV and cable television systems. IWP 11/5 is further required to collect data regarding the compatibility of new systems with existing terrestrial services, including cable distribution. The meeting was scheduled to prepare a first report on these items, in due time, for submission to the Extraordinary meeting of Study Group 11 (Broadcasting service (television)) on HDTV. This report, in parts I and II respectively, gives the information currently available on protection ratios and compatibility applicable to HDTV systems.

The task of recommending protection ratios for HDTV is rendered difficult by the diversity of strategies in different parts of the world where satellite transmission, terrestrial emission and cable distribution have different requirements and priorities. The MUSE family, the HDMAC family and a group of *NTSC*-compatible systems are typical examples which have been discussed extensively. IWP 11/5 came to the conclusion that for *AM-VSB* systems it would be advantageous to use common modulation characteristics for HDTV cable transmission and in terrestrial emission.

The IWP recognized that parts I and II of its report are far from complete and that further extensive studies were needed. Consequently, some guidance is given in an additional part III on methods considered appropriate for determining protection ratios applicable to HDTV systems, once such systems are sufficiently specified.

At present, administrations are studying the relative merits of alternative approaches to the introduction of HDTV broadcasting. As pointed out by IWP 11/5 in its report, limiting the number of possible approaches would have the desirable effect of reducing the number of cases which require different protection ratio values and would be in the interest of efficient spectrum planning.

In addition to HDTV protection ratios, the following items have been discussed:

Out-of-channel response of television receivers

Receiver characteristics should be taken into account in television planning particularly for the definition of sharing criteria. For this reason, JIWP AFBC(2) had already discussed the results of recent investigations on this subject for inclusion in the CCIR Report to AFBC(2). IWP 11/5 approached the matter in a more general way without restriction to a particular region in order to properly update relevant CCIR texts. Further discussion on this subject is expected to take place during the Final meeting of Study Group 11 in October 1989.

Protection ratios required for television signals having a digitally modulated sound carrier

Results on required protection ratios for television *D/SECAM* system in the presence of a NICAM 728 digital sound signal associated with *B/PAL* system have been reported to the IWP, adding useful information to earlier contributions. The Final meeting of Study Group 11 will have to conclude on this subject since systems using digitally modulated sound will be in operation in the near future.

Rearrangement of Questions and Study Programmes of Study Group 11

This topic is under consideration in IWP 11/8 but advice is sought from all the other groups. IWP 11/5 scrutinized the television planning part of a proposal for a rearrangement, prepared by IWP 11/8. A number of suggestions for possible improvement will be transmitted to the Chairman of IWP 11/8.

S. D.

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Meeting of Interim Working Party 4/2

Implementation of digital satellite systems

Interim Working Party 4/2 (Role of satellite connections in the integrated services digital networks), as established by Decision 70, held its fifth meeting from 15 to 22 March 1989 in Bali (Indonesia), at the kind invitation of the Indonesian Administration and Perumtel, under the chairmanship of Mr J. B. Potts (United States).

The meeting was attended by 21 delegates from eight administrations, the International Telecommunications Satellite Organization (INTELSAT), the European Telecommunications Satellite Organization (EUTELSAT) as well as Messrs E. Hauck and P. Remedi, Chairman and Vice-Chairman respectively of Study Group 4 (Fixed-satellite service) and Wu Deyan, Senior Counsellor of the CCIR.

The meeting considered a wide range of subjects related to digital satellite communications of which many were directed to ISDN and B-ISDN matters. It also developed several documents for contribution to CCITT Study Groups IV (Maintenance) and XVIII (ISDN) meetings to be held in 1989.

Various aspects of performance including laboratory measurements and simulation of the fading environment at high-bit rates, with and without coding, were presented to the meeting. Much of the focus on measurements was to establish the effects of the bursty nature of errors that might be caused by the use of coding on the parameters of most interest and this material will be included in the texts of Study Group 4 this fall.

The meeting also covered topics related to special aspects of operation within the ISDN with a view to forming the basis of a new Report of Study Group 4. The new material includes texts on broadband ISDN (B-ISDN) and the synchronous digital hierarchy (SDH), topics which are currently of interest to the CCITT as they focus on B-ISDN matters.

In connection with CCITT activities on B-ISDN, which are of special interest, are developments in the field of digital television which is an obvious choice for one possible need for B-ISDN. Performance of digital television is under study by the CMTT and IWP 4/2 gave some consideration to the use of digital television in B-ISDN. However, up to now, there is little information available to give more specific guidance. This situation is likely to change in the near future and the need for establishing more formal channels with CMTT was identified for action by Study Group 4 at its Final Meeting. The performance aspects of digital television could have significant impact on satellite systems providing B-ISDN facilities.

IWP 4/2 considered other applications of satellite links in the ISDN as well as in digital satellite networks both in the context of private ISDNs (as is being discussed in the CCITT) as well as in dedicated networks (as conceived for business services) such as EUTELSAT-SMS or INTELSAT-IBS.

Interference problems that might arise from the use of coding on digital systems received some consideration and particular difficulties were identified for further study.

The Group generally agreed that the need will continue, at least, through the next study period. Conclusions on B-ISDN in the CCITT are scheduled for the end of 1990 and the incompatibilities of the meeting schedules of the CCIR and CCITT make it desirable for the continuation of IWP 4/2.

The Chairman stressed the outstanding provisions made for the meeting and its participants and thanked, on behalf of all those who attended, for making their stay so comfortable and enjoyable.

J. B. P.

CORRIGENDUM

Meeting of Interim Working Party CMTT/3

In the April issue of the "Journal", page 211, the photograph of Mr A. Brown was published in error and should be replaced by the one in the margin.

Meeting of the Co-ordination Committee of the Plan Committee for Asia and Oceania

The Co-ordination Committee of the Plan Committee for Asia and Oceania, the terms of reference and composition of which were adopted at the Bali meeting in 1986 [1], met at Manila from 15 to 17 February 1989 at the kind invitation of the telecommunication authorities and recognized private operating agencies of the Philippines.

At the opening meeting, participants were welcomed by Mr J. L. A. Alcuaz, Commissioner, National Telecommunications Commission. Mr M. Malek Asghar, CCITT Senior Counsellor, thanked the host administration and introduced Mr J. L. Parapak (Indonesia), who had been appointed Chairman of the Plan Committee for Asia and Oceania by the IXth CCITT Plenary Assembly (Melbourne, 1988); he also announced the appointment of the new Vice-Chairmen of the Regional Plan Committee: Messrs A. R. A. Al-Fehaid (Saudi Arabia), Han Songlin (China) and H. Mahyar (Islamic Republic of Iran).

After thanking the CCITT Plenary Assembly and, in particular, the members of the region for appointing him, Mr Parapak highlighted the Regional Plan Committee's important role in the telecommunication network planning process at a time when technological advances and changes in the telecommunication environment were making it imperative for the countries of the region to co-operate with one another more closely than ever before. He also stressed that the Regional Plan Committee was a forum which could effectively meet telecommunication development requirements in the region.

Speaking at the opening meeting, Mrs J. T. Lichauco, Under-Secretary, Department of Transportation and Communications, after reviewing telecommunications development policy in the Philippines, rationalization of the sectors concerned and the increasingly fast pace of telecommunications development, also touched on the role of the private and government sectors in the field.

Addressing the delegations, she referred to the task of the Regional Plan Committee and, welcoming them on behalf of the Philippines Government, opened the meeting of the Co-ordination Committee.

1. Items on the agenda included, in particular:

- general survey of events relating to the work of the Plan Committee for Asia and Oceania since the last meeting of the Committee (Bali, 1986);
- preparations for the next meeting of the Plan Committee for Asia and Oceania (Bangkok, 1990), taking into account the deliberations and decisions of the latest meeting of the Regional Committee (Bali, 1986) and the deliberations and decisions of the World Plan Committee (Lisbon-Estoril, 1988);
- Regional Plan Questionnaire;
- development of the Plan data bank – direct access;
- possible consideration of subjects (in the field of CCITT and CCIR activities) relating to telecommunication planning and development and of particular interest to the region.

2. The CCITT Secretariat gave a general summary of the activities of the Plan Committee for Asia and Oceania since its last meeting in Bali in 1986, referring in particular to the reliability of traffic and circuit data, in the form of existing data for N=1982 and N=1987, with the forecasts made in the same years for 1987 and 1992, respectively, and the decisions of the World Plan Committee and of the IXth CCITT Plenary Assembly concerning the Plan Committee's work.

3. With preparation of the work of the next Regional Plan Committee in mind, the Co-ordination Committee reviewed the current Regional Plan questionnaire and noted that Regional Plan questionnaires, with the exception of the European Plan questionnaire, were prepared in the same format as the World Plan questionnaire. On account of the computer program, it was suggested that the present format should be left unchanged. However, for the purposes of the Regional Committee's work, new tables and new data could be incorporated in the questionnaire.

4. In drawing up the agenda for the next meeting of the Regional Plan Committee, the Co-ordination Committee proposed that in addition to replies to the Questionnaire (Plan data) and country documents on the development of telecommunications in the region and progress accomplished at the regional level, arrangements should be made for Special Rapporteurs to present reports on the following subjects:

- Existing and planned submarine cables in the region
- National and international (regional) satellite communication systems

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- Development of the Asian telecommunication network
- Development of the Arab telecommunication network
- Development of the Far Eastern and Oceanian network
- Co-ordination of signalling systems in the region (Signalling System No. 7)
- Co-ordinated development of network digitization in the region
- Development of new services in the region
- Development of mobile systems in the region–Aeronautical system
- Development of the tariff policy in the region.

The Administrations of the Philippines, Indonesia, Kuwait, Japan, India and Thailand agreed to designate Rapporteurs, and the Administrations of Saudi Arabia, Australia and Singapore undertook to provide assistance in drawing up the reports. [2]

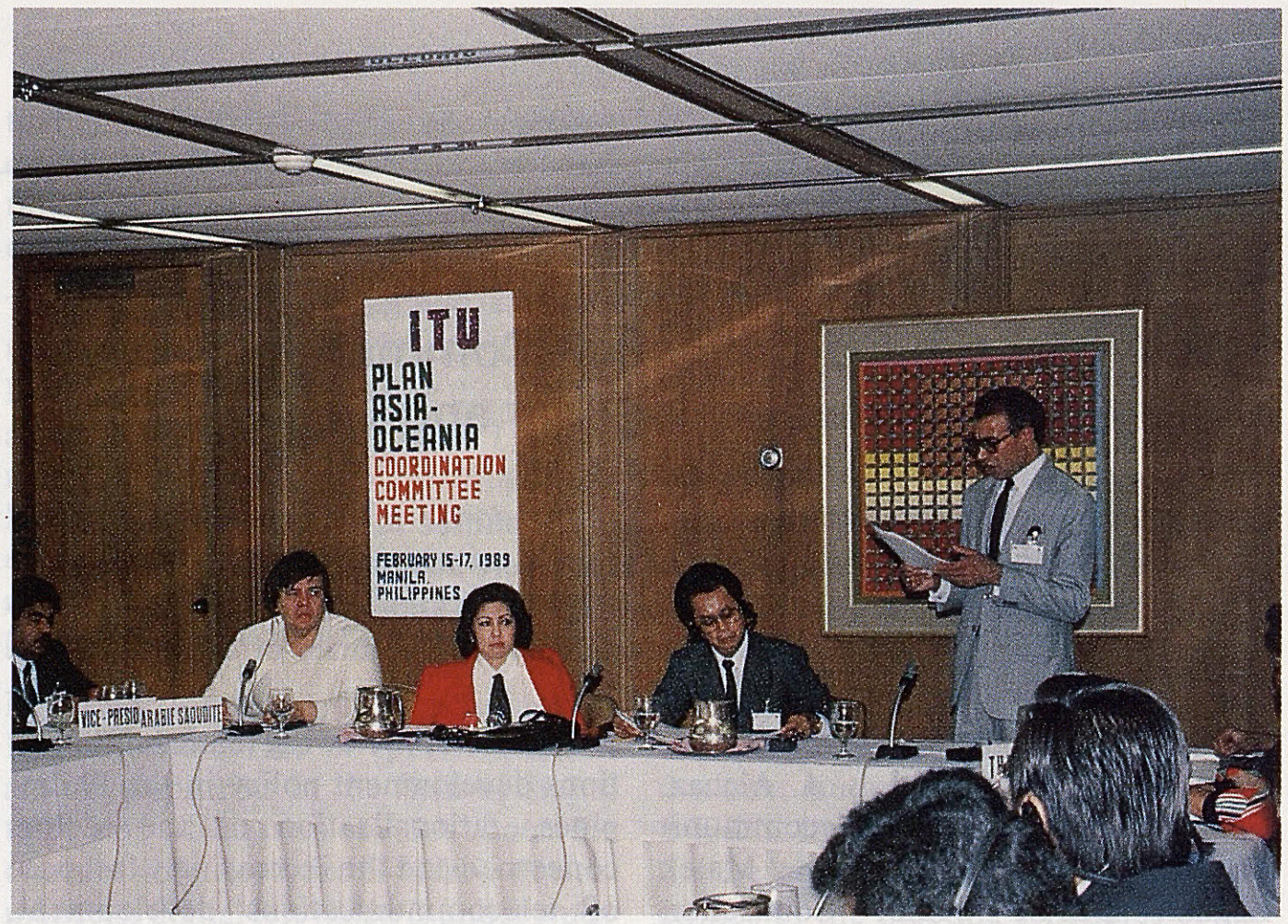
5. Round table: new regulatory environment for telecommunications

Having regard to the development of the telecommunication environment in the region, the Committee suggested that the standpoints of governments, operators and users should be discussed at the round table. With the participants' agreement, these standpoints will be presented as follows:

- Japan, United Arab Emirates: governments' standpoint;
- Indonesia, Australia: operators' standpoint;
- Philippines, INTUG: users' standpoint.

6. Special meeting 1: Digital network–New services

It was decided that special meeting 1 would consider digital network planning in the region, operational aspects and the



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From left to right: Mr J. L. A. Alcuaz, Commissioner, National Telecommunications Commission; Mrs J. T. Lichauco, Under-Secretary, Department of Transportation and Communications; Messrs J. L. Parapak (Indonesia), Chairman of the Plan Committee for Asia and Oceania and M. Malek Asghar, Senior Counsellor, CCITT

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View of the meeting room

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experience of the countries in the region, since the technical aspects and economic considerations relating to the transition from an analogue to a digital network had already been discussed at previous meetings.

As far as new services are concerned, a report would be prepared setting out the users' standpoint and discussing the marketing of new services.

The Administrations of India, Singapore and Australia will be invited to present reports at special meeting 1.

7. Special meeting 2: Network management

The subject of special meeting 2 will be approached from three different angles:

- networks in the course of development: a report will be presented by Saudi Arabia;
- advanced technology and future development in the area of network management: these aspects will be dealt with in a report by the American Telephone and Telegraph Company (AT&T);
- network management in metropolitan areas: two reports, by Japan and Hongkong, respectively, will be presented on this topic.

8. The Committee took note of the document on development of the Plan data bank and direct access. After reviewing the background of the development of the data bank and the possibilities of direct access, the CCITT Secretariat gave details concerning the work of the pilot group (direct access) set up by the World Plan Committee (Lisbon-Estoril, 1988). It also informed the Committee that, according to the latest information available, direct access to the Plan data bank would be effected in accordance with the procedure described in the document entitled: "Direct access to the ITU Plan system–Proposed new procedures:. The latter document was in the same spirit as the documents presented by the General Secretariat at the IXth CCITT Plenary Assembly, regarding the computerized exchange of information between the ITU and its Members.

The Co-ordination Committee requested that arrangements be made, in co-operation with the Thai Administration, to provide delegations with direct access to the Plan data bank during the meeting in Bangkok in 1990.

9. Date of the Regional Plan Committee meeting

Taking into account the proposal made by the Administration of Thailand, the Co-ordination Committee noted with pleasure that the next meeting of the Regional Plan Committee would be held in Bangkok in October/November 1990.

The head of the Thai Delegation, referring to his government's invitation to the Regional Plan Committee, invited all the countries in the region to take part in the Bangkok meeting, to which his Administration attached great importance for the development of regional telecommunications.

M. M. A.

References

[1] Report PLAN AS-R2 (November 1986)

[2] Report PLAN AS-R1 (February 1989)

"Golden Antenna 91" launched

The "Golden Antenna 91", 6th International Film/Video Festival on Telecommunications and Electronics, has been launched with an invitation to participate sent to all telecommunication administrations of the ITU Member countries as well as to a large number of scientific and industrial organizations all over the world.

Organized by the ITU, within the framework of TELECOM 91, the "Golden Antenna 91" Festival will be held from 8 to 15 October 1991 and will also be part of the ITU's contribution to the "World Decade for Cultural Development (1988-1997)". It aims to encourage world-wide production of high quality films or videos and to provide an opportunity for the general public, as well as specialists, to evaluate the progress made in telecommunications and electronics and their impact on socio-economic development in today's world.

The Festival Secretariat at ITU headquarters has already received dozens of requests for information and registration in the Festival, reflecting the record-breaking success of the 1987 Festival where 76 films from 23 countries and two regional organizations were screened together with four films presented *hors concours*.

Admission to the Festival

Those eligible to enter the "Golden Antenna 91" Festival are:

a) governments of the Member countries of the ITU (including telecommunication administrations, broadcasting organizations, and recognized private operating agencies);

b) commercial enterprises participating in TELECOM 91 as exhibitors;

c) scientific or industrial organizations participating in the work of the International Consultative Committees of the ITU;

d) United Nations and specialized agencies, and other international or regional organizations.

Technical requirements

No production may be more than five years old. Productions may be in black-and-white or colour and must be either on 16 or 35 mm film, or on videotape recordings (VTR) which must conform to the PAL, SECAM or NTSC standards and video cassettes must be of U'MAT IC, VHS or BETAMAX format. Other productions requiring special projection equipment may be accepted if the participants bear the responsibility for the installation and operation of the equipment.

Categories

Productions presented at the Festival will be grouped in five categories:

- productions on telecommunications and electronics in general made for public information;
- productions on specific telecommunication services made for public information;
- publicity, advertising or promotional productions on telecommunications or electronics;
- productions concerned with technical research and/or with specific telecommunications or electronics techniques;
- vocational training productions in the fields of telecommunications and electronics and those produced under the Union's technical co-operation programme for the development of telecommunications in Member countries.

International Jury

An International Jury of experts in the fields of telecommunications and electronics as well as in audio-visual arts will view all the productions entered in the Festival by category. Due regard will be given to the purpose of each production and its intended audience. Criteria applicable in the awarding of points will be based on the audio-visual impact, the content/purpose achieved and the promotion of telecommunications at national and international levels.

Prizes and awards

The "Golden Antenna 91" will be awarded to the production judged to be the best in the Festival, and "Silver Antennae" and "Bronze Antennae" will be awarded to the first and second prize-winners in each category respectively. The International Jury may also award "Special Mentions" or "Honourable Mentions" to productions which are of particular interest for their artistic, technical or other qualities. All productions which are admitted to the competition will receive an official certificate of participation in the Festival. Governments, companies, organizations or individuals are invited to donate prizes for Special and Honourable Mentions winning entries. However, the jury will be responsible for awarding these prizes.

Catalogue

An official catalogue giving information on all the productions presented in each category will be published and distributed to all participants. A number of catalogues will be made available on request to TELECOM 91 visitors as long as stocks last.

Screenings

The awards and prize-giving ceremony will take place at TELECOM 91, during which all the productions accepted for the Festival will be screened. All screenings at the Festival will be open to the public. A daily programme will be published during the exhibition.

ITU Film Library

Previous Film Festivals have enabled the ITU Film Library to enlarge its collection of films and video cassettes. This film material is of great value to administrations, universities, teaching and training institutions, organizations, etc., which make regular use of the ITU Film Library's facilities. It is hoped that participants in the "Golden Antenna 91" Festival will also donate their productions to the ITU Film Library and will authorize the ITU to screen them—subject to an appropriate reference being made to their origin—for non-commercial and non-profit making purposes, in the 166 Member countries of the ITU.

For further information on the "Golden Antenna 91" Festival, please write to: "The Secretariat, "Golden Antenna 91", Public Relations Division, International Telecommunication Union, Place des Nations, CH-1211 Genève 20 (Switzerland)". Tel.: +41 22 730 52 48. Telex: 421 000 UIT CH. Telefax: +41 22 733 72 56. Teletex: 228–46815100=UIT.

Technical Co-operation

African Development Fund finance for the RASCOM feasibility study

On 9 March 1989, a memorandum of understanding was signed at the headquarters of the African Development Bank (AfDB) in Abidjan (Côte d'Ivoire) by the African Development Fund (ADF), represented by Mr G. Avika, one of the Vice-Presidents of the AfDB, and the International Telecommunication Union (ITU), represented by its Deputy Secretary-General, Mr J. Jipguep.

In accordance with this memorandum of understanding, the ADF is donating to the ITU a sum made up of various convertible currencies to a maximum amount equivalent to 3 227 000 units of account (approximately 3 750 000 United States dollars (USD) or about 6 million Swiss francs) to finance part of the feasibility study for the regional African satellite communications system for the development of Africa (RASCOM), for which the ITU is the lead agency.

The RASCOM project

One of the main objectives of RASCOM is to promote economic and social development through the improvement of telecommunication facilities in African countries, taking account of the opportunities offered by space communications.

The feasibility study for RASCOM is a total network study for Africa, commissioned by the African ministers of planning, transport and communication with a view to ascertaining the long-term requirements and providing efficient and well-managed communications facilities for the development of the continent as a whole. The project is seen as a concrete expression of Africa's aspirations to promote the economic integration of the continent and to increase the overall GNP through the provision of basic communications facilities with particular emphasis on the rural areas where the majority of the African population resides.

Speaking at the signing ceremony, Mr Avika said: "The African Development Fund's decision to make a direct donation to the ITU of 3.227 million FUA for the execution of the study is a clear demonstration of our confidence in the ITU's know-how in this area". He also added: "RASCOM is not meant to supplant the present network; it is designed to improve and complete the installations which already exist".

After thanking the AfDB Group, Mr Jipguep said "Because of its implications and its complexity, the RASCOM project is quite unique in the way it is structured. It brings African political authorities and experts together at the national level for the purpose of identifying and defining requirements, and at the regional level for the purpose of designing and orienting the project in a way which makes allowance for the individual concerns of all the participating countries.

. . . . .

By making such a substantial grant to the RASCOM project, the AfDB has done much to consolidate the neutral and independent character of the project... Thanks to the action of the Bank, the African authorities will be in a position to have available at the end of the study all the possible options which present-day technology can offer. The industrial and economic consequences are such that they will give rise to fundable investment projects in which the AfDB will be the first to take an interest".

According to the schedule approved by the last meeting of the Interim Executive Committee held in Addis Ababa in October 1988, the total project duration will be 43 months. The study, which began in March 1987 with the establishment of the project office at ITU headquarters in Geneva, is scheduled to be completed in July 1990, when the final report will be delivered, all the national studies having been completed at the end of 1988.

The study, the total cost of which is estimated at 7.5 million USD, is also co-financed by the Organization of African Unity (OAU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Development Programme (UNDP), ITU and by Italy and the Federal Republic of Germany, both countries having agreed to make their contributions on a multilateral basis.

Frequency plan for broadcasting in the Yemen Arab Republic: contract signed

As part of a UNDP/ITU technical co-operation project in the field of broadcasting, a contract was signed on 9 March 1989 by Messrs Z. Bizri, Area Manager for the Arab World of *SOFRATEV*, H. Al-Nounou, Technical Adviser at the Ministry of Information of the Yemen Arab Republic and R. E. Butler, Secretary-General of the ITU. The signing ceremony took place in the presence of Messrs Y. Geghman, Ambassador of the Yemen Arab Republic to the United Nations Office at Geneva, and J. Knoeri, Technical Director of SOFRATEV. SOFRATEV is a French consulting company.

The object of the contract, valued at 1 075 000 United States dollars (USD), is to provide the Yemen Arab Republic with a well-co-ordinated frequency plan for FM radio and television broadcasting. The plan should cover both existing requirements and future needs and extend the coverage to the entire country with satisfactory reception quality. The draft plan will also serve as a basis for consideration of the country's requirements when a new television broadcasting plan is drawn up next November/December by the Regional Administrative Conference for the planning of VHF/UHF television broadcasting in the African broadcasting area and neighbouring countries–AFBC(2).

Field-strength measurements

At the signing ceremony, Mr Butler underlined the necessity of drawing up very well developed broadcasting plans based on actual field-strength measurements, given the topography of the

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Left to right: Messrs Y. Geghman, H. Al-Nounou, R. E. Butler and Z. Bizri

country and the special propagation characteristics of the region.

Mr Geghman considered that the improvement of radio and television broadcasting through full coverage of the populated areas in the Yemen Arab Republic will play a major role in the social and economic development of the isolated valley areas and in a better social integration of women by improving their education. An analysis reveals that 60% of radio programmes and 25% of television programmes in the country are devoted to culture and education.

The contract covers the following main activities:

- fact finding activities to collect all the information necessary for the project and in particular, information on areas, valleys and regions not yet covered or improperly covered by the existing network and interference problems;
- the preparation of a field measurement workplan, in co-operation with the Radio and Television Corporation of the Yemen Arab Republic;
- the actual field measurements to ensure optimal solutions;
- the preparation of FM sound and television broadcasting plans for the Yemen Arab Republic.

SOFRATEV has already started the field surveys and should have completed its work before the end of the year.

Before 1963, the country lacked a modern infrastructure for transport and communications, including sound and television broadcasting. Since 1977, priority has been given to this sector. The current five-year development plan (1987-1991) for radio and television broadcasting, estimated at 800 million Yemeni rials (80 million USD), will provide the country with two new medium-wave transmitters, 24 FM transmitters, three HF radio transmitters and television retransmitters. Almost 25% of the budget will be allocated to improving television retransmitters. Almost 25% of the budget will be allocated to improving television coverage, using mainly small powered television retransmitters, so as to reach 95% of the population.

Departures on mission

country and place of assignment	expert	title of post	période and contract and programme*
Central African Republic Bangui	Bhardwaj R. N. (India)	Senior expert in domestic satellite system maintenance (PNAM)	3.4.89–23.5.89 UNDP
Chad Sarh	Rambaud M. (France)	Expert in local network course design	3.4.89–2.7.89 UNDP
Colombia Bogota	Alonso E. (Spain)	Specialist in cellular mobile telephony	11.4.89–7.5.89 ITU
Medellin	Fried T. (Sweden)	Specialist in computer-aided network planning (PLANITU)	7.4.89–17.4.89 FT

country and place of assignment	expert	title of post	period of contract and programme*
Costa Rica San José	Fried T. (Sweden)	Specialist in computer-aided network planning (PLANITU)	18.4.89–19.4.89 ITU
Ecuador Guayaquil	Molano E. (Colombia)	Specialist in outside plant	10.4.89–11.4.89 ITU
El Salvador San Salvador	Leijon K. H. (Sweden)	Specialist in subscriber and traffic forecasting (PLANITU)	19.4.89–22.4.89 ITU
	Fried T. (Sweden)	Specialist in computer-aided network planning (PLANITU)	20.4.89–22.4.89 ITU
Fiji Suva	Glover M. J. (Australia)	Senior expert in outside plant planning	29.4.89–27.5.89 UNDP
Gambia Banjul	Moshiro S. (Tanzania)	Specialist in telecommunications policy	25.4.89–2.6.89 UNDP
Honduras Tegucigalpa	Fried T. (Sweden)	Specialist in computer-aided network planning (PLANITU)	23.4.89–30.4.89 UNDP
	Leijon K. H. (Sweden)	Specialist in subscriber and traffic forecasting (PLANITU)	23.4.89–30.4.89 UNDP
	Legarraga J. (Chile)	Senior expert in pre-investment and feasibility studies	24.4.89–23.7.89 UNDP
Mozambique Maputo	Dalmaz K. (Turkey)	Senior expert in economic and financial analysis	16.4.89–30.4.89 UNDP
	Sloan R. (Ireland)	Senior expert in maintenance management	22.4.89–9.6.89 UNDP
Netherlands Antilles Curaçao	Timmers A. (Canada)	Senior expert in satellite communications	30.4.89–22.5.89 FT
Rwanda Kigali	Gorski R. (Poland)	Senior expert in local network planning	3.4.89–2.7.89 UNDP
	Capelle L. (Belgium)	Senior expert in planning and in training of personnel in television broadcasting and organization structure	24.4.89–25.5.89 UNDP
	Laffont-Lozes J. Y. (France)	Senior expert in preparation of television programmes	24.4.89–25.5.89 UNDP
	Pittet E. (Switerland)	Senior expert in television broadcasting (studios)	25.4.89–11.5.89 UNDP
Western Samoa Apia	Hewitt L. J. (New Zealand)	Senior expert in external plant	29.4.89–28.7.89 UNDP
São Tome and Principe São Tome	Goubet F. (France)	Specialist in maritime radiocommunications	4.4.89–5.5.89 FT
	Jeandat A. (Mrs) (France)	Specialist in informatics (analyst)	4.4.89–7.6.89 FT

country and place of assignment	expert	title of post	period of contract and programme*
São Tome and Principe *(continued)*	Nathie J. P. (France)	Specialist in economic and financial studies	4.4.89–7.6.89 UNDP
	Sigrist G. (France)	Specialist in organization and manpower studies	4.4.89–6.5.89 UNDP
	Normand M. (France)	Specialist in electric power supply systems	8.4.89–30.4.89 FT
	Dunin J. (Poland)	Specialist in tariffs	17.4.89–20.5.89 UNDP
Switzerland Geneva	Capitaine P. (France)	Specialist in telecommunication management development and training in Asia	15.4.89–21.5.89 UNDP
	Anastassiades C. (Cyprus)	Senior expert in sound broadcasting planning in Africa	16.4.89–2.7.89 FT
Uruguay Montevideo	Berry J. (United States)	Senior expert in cellular radio systems	6.4.89–4.5.89 CTD
Yemen (R.D.P. of) Aden	Cavet J. J. (France)	Senior expert in microwave systems	1.4.89–17.4.89 UNDP

*UNDP = United Nations Development Programme.
FT = Funds-in-Trust.
CTD = Centre for Telecommunications Development.

Official Announcements

INTERNATIONAL TELECOMMUNICATION CONVENTION (NAIROBI, 1982)

The Governments of **Austria** and the **People's Democratic Republic of Yemen** have ratified the above-mentioned Convention.

The instruments of ratification were deposited with the General Secretariat of the Union on 30 and 22 March 1989, respectively.

OPTIONAL ADDITIONAL PROTOCOL TO THE INTERNATIONAL TELECOMMUNICATION CONVENTION, NAIROBI, 1982, ON THE COMPULSORY SETTLEMENT OF DISPUTES

The Government of **Austria** has ratified the above-mentioned Protocol.

The instrument of ratification was deposited with the General Secretariat of the Union on 30 March 1989.

FINAL ACTS OF THE WORLD ADMINISTRATIVE RADIO CONFERENCE FOR THE PLANNING OF THE HF BANDS ALLOCATED TO THE BROADCASTING SERVICE (HFBC-87) (GENEVA, 1987)

The Government of **Mexico** has approved the above-mentioned Acts.

INTERNATIONAL TELEGRAPH AND TELEPHONE CONSULTATIVE COMMITTEE (CCITT)

With the approval of the Administration of the United States, **Octocom Systems, Inc.,** Wilmington (Massachusetts) and **Worldcom, Inc.,** New York, have been admitted to take part in the work of the CCITT.

With the approval of the Administration of Sweden, **Standard Radio & Telefon AB,** Vällingby (Sweden), has been admitted to take part in the work of the CCITT.

CALENDAR OF ITU CONFERENCES AND MEETINGS

DATE	TITLE	PLACE
1989		
23 May-29 June	**Plenipotentiary Conference**	**Nice**
24-25 May	**Final meeting of the 44th Session of the Administrative Council**	**Nice**
3-8 October	**ITU-COM 89—1st World Electronic Media Symposium and Exhibition**	
	1st World Book and Audiovisual Fair on Telecommunications and Electronic Media	**Geneva**
13 November-8 December	**Regional Administrative Conference for the planning of VHF/UHF television broadcasting in the African broadcasting area and neighbouring countries** (Second session)—AFBC(2)	**Geneva**
4-5 December	**Regional Administrative Conference of the Members of the Union in the African broadcasting area to abrogate the regional agreement for the African broadcasting area (Geneva, 1963)**	**Geneva**
	International Radio Consultative Committee (CCIR):	
	(Interim Working Party meetings)	
25 May-8 June	Interim Working Party 8/13 (Future public land mobile telecommunication systems)	Hakone
8-13 June	Joint Interim Working Party 10-11/3 (Satellite broadcasting of high definition television (HDTV) signals and unified standards for the accommodation of picture signals and several audio signals and data signals in terrestrial and satellite television channels)	Stockholm
13-22 June	Interim Working Party 4/1 (Technical considerations affecting the efficient use of the geostationary-satellite orbit)	Stockholm
14-16 June	Joint Interim Working Party 10-11/5 (Services using data broadcasting)	Geneva
26-28 June	Interim Working Party 11/7 (Digital television standards)	Geneva
26-30 June	Joint Interim Working Party CMTT-4-10-11/1 (Satellite news gathering (SNG))	Paris
29 June-1 July	Interim Working Party CMTT/2 (Digital transmission of component-coded television signals)	Geneva
10-14 July	Interim Working Party 1/2 (Spectrum management and computer-aided techniques)	Tokyo

DATE	TITLE	PLACE
6-8 September	Interim Working Party CMTT/3 (Television and sound signals in the broadband ISDN)	Geneva
5-6 October	Interim Working Party 10/1 (Calculation of the radiation patterns of HF antennas)	Geneva
	(Final Study Group meetings)	
5-12 September	Study Group 7 (Standard frequencies and time signals)	Geneva
6-19 September	Study Group 2 (Space research and radioastronomy services)	Geneva
6-19 September	Study Group 6 (Propagation in ionized media)	Geneva
13-19 September	Study Group 3 (Fixed service at frequencies below about 30 MHz)	Geneva
19 September-5 October	Study Group 5 (Propagation in non-ionized media)	Geneva
20 September-5 October	Study Group 9 (Fixed service using radio-relay systems)	Geneva
20 September-6 October	Study Group 4 (Fixed-satellite service)	Geneva
9-20 October	CMTT (CCIR/CCITT Joint Study Group for television and sound transmission)	Geneva
9-23 October	Study Group 10 (Broadcasting service (sound))	Geneva
9-25 October	Study Group 11 (Broadcasting service (television))	Geneva
23 October-8 November	Study Group 8 (Mobile, radiodetermination and amateur services)	Geneva
24-27 October	CMV (CCIR/CCITT Joint Study Group for vocabulary and related subjects)	Geneva
26 October-8 November	Study Group 1 (Spectrum utilization and monitoring)	Geneva
	International Telegraph and Telephone Consultative Committee (CCITT):	
29 May-2 June	Study Group V (Protection against electromagnetic effects)	Geneva
5-9 June	Study Group VI (Outside plant)	Geneva
13-16 June	TEUREM (Tariffs (Europe and the Mediterranean Basin))	Geneva
19-30 June	Study Group XVIII (ISDN)	Geneva
26-27 June	Joint meeting of experts of Study Groups XV and XVIII	Geneva
3-5 July	Working Party IV/4	Geneva

DATE	TITLE	PLACE
3-13 July	Study Group VII (Data communications networks)	Geneva
6-11 July	Working Party IV/3	Geneva
30 August-6 September	Plan Committee for Latin America	San José (Costa Rica)
5-8 September	GAS 7 (Rural telecommunications)	Geneva
18-22 September	GAS 12 (Strategy for the introduction of new non-voice telecommunication services in developing countries)	Geneva
26-29 September	Study Group XVII (Data transmission over the telephone network) and its Working Parties	Geneva
10-20 October	Working Parties of Study Group III (Tariff and accounting principles)	Geneva
16-20 October	GAS 9 (Economic and technical aspects of transition from an analogue to a digital network (Case study of a global network))	Geneva
23 October-3 November	Working Parties of Study Group II (Network operation)	Geneva
6-15 November	Working Parties of Study Group X (Languages for telecommunication applications)	Geneva
20 November-1 December	Working Parties of Study Group XV (Transmission systems and equipment)	Geneva
4-15 December	Working Parties of Study Group XI (Switching and signalling)	Geneva
	Technical Cooperation	
11-16 September	Regional Coordination Meeting on the ITU/CODEVTEL International Sharing System for Europe and the Arab States (ISS-RCM-89)	Darmstadt
27-30 September	Seminar on human resources management and development for broadcasting organizations in the least developed countries	Geneva
	International Frequency Registration Board (IFRB):	
6-7 October	HFBC Information Meeting	Geneva

ITU Publications

The following letters indicate the languages in which documents are published:

F *for French* | **R** *for Russian*
E *for English* | **C** *for Chinese*
S *for Spanish* | **A** *for Arabic*

Prices are in Swiss francs.

Note

A comprehensive list of all the publications of the Union will be supplied, free of charge, from the ITU Secretariat, Geneva.

PUBLICATIONS ISSUED

since the last number of the Journal

Final Acts of the Regional Administrative Conference of the Members of the Union in the African Broadcasting area to abrogate certain parts of the Geneva Agreement (1963) (Geneva, 1985)

(ISBN 92-61-02576-5)

Edition **A.**

Price: 8 Sw.fr.

Final Acts of the World Administrative Radio Conference for the planning of the HF bands allocated to the broadcasting service (HFBC-87) (Geneva, 1987)

(ISBN 92-61-03106-4)

Edition **A.**

Price: 50 Sw.fr.

Final Acts of the World Administrative Radio Conference for the mobile services (MOB-87) (Geneva, 1987)

(**C** = *ISBN 92-71-05005-3*
R = *ISBN 92-61-03104-8)*

Separate editions in **C** and **R.**

Price: 129 Sw.fr.

Yearbook of common carrier telecommunication statistics (16th edition, chronological series 1978-1987)

(ISBN 92-71-14061-3)

Trilingual edition **F, E, S.**

Price: 61 Sw.fr.

IFRB
International Frequency Registration Board

Summary of monitoring information received by the IFRB for the period from 1 July to 30 September 1988

No. 239

Trilingual edition **F, E, S.**

IFRB/CCIR booklet on national frequency management (2nd edition, 1988)

(**F** = *ISBN 92-61-03852-2*
E = *ISBN 92-61-03851-4*
S = *ISBN 92-61-03853-0)*

Separate editions in **F, E, S.**

Price: 8 Sw.fr.

CCIR
International Radio Consultative Committee

XVIth Plenary Assembly, Dubrovnik, 1986

Volume IX.1—Fixed service using radio-relay systems

(ISBN 92-61-02804-7)

Edition **R.**

Price: 122 Sw.fr.

Volume X/XI.3—Sound and television recording

(ISBN 92-61-02834-9)

Edition **R.**

Price: 39 Sw.fr.

CCITT
International Telegraph and Telephone Consultative Committee

VIIIth Plenary Assembly, Malaga-Torremolinos, 1984

Red Book

Volume III

Fascicle III.1—General Characteristics of international telephone connections and circuits. Recommendations G.101-G.181

(ISBN 92-61-02044-5)

Edition **R.**

Price: 46 Sw.fr.

IXth Plenary Assembly, Melbourne, 1988

Blue Book

Volume VIII

Fascicle VIII.2—Data communication networks: services and facilities, interfaces. Recommendations X.1-X.32

(**F** = *ISBN 92-61-03672-4*
E = *ISBN 92-61-03671-6*
S = *ISBN 92-61-03673-2)*

Separate editions in **F, E, S.**

Price: 81 Sw.fr.

FORTHCOMING PUBLICATIONS

Final Acts of the World Administrative Radio Conference for the mobile services (MOB-87) (Geneva, 1987)

Edition **A.**

Benefits of telecommunications to the transportation sector of developing countries—A case study in the People's Democratic Republic of Yemen and its generally applicable conclusions

Separate editions in **F, E, S.**

Report: "Contribution of telecommunications to the earnings/savings of foreign exchange in developing countries"

Separate editions in **F, E, S.**

Study of the costs of providing and operating telecommunication services between industrialised and developing countries

Separate editions in **F, E, S.**

List of radiodetermination and special service stations (List VI) (10th edition, 1989)

Trilingual edition **F, E, S.**

Final Acts of the Regional Administrative Radio Conference to establish a plan for the broadcasting service in the band 1605-1705 kHz in Region 2 (Rio de Janeiro, 1988)

Separate edition in **F, E, S.**

List of call signs and numerical identities of stations used by the maritime mobile and maritime mobile-satellite services (List VIIA) (14th edition, 1989)

Multilingual edition in **F, E, S, R, C.**

List of international telephone routes (29th edition, 1989)

Trilingual edition **F, E, S.**

Table of international telex relations and traffic (position on 31 December 1988)

Trilingual edition **F, E, S.**

USERCOM 89 Proceedings

Edition **E** only.

IFRB
International Frequency Registration Board

Summary of monitoring information received by the IFRB

No. 240

Trilingual edition **F, E, S.**

Preface to the International Frequency List and the Weekly IFRB Circular (12th edition, September 1988)

Separate editions in **A, C, R.**

International frequency list (Edition 12.2, 31 March 1989) (publications on microfilm)

Trilingual edition **F, E, S.**

CCIR
International Radio Consultative Committee

XVIth Plenary Assembly, Dubrovnik, 1986

Volume IV.1—Fixed-satellite service (Study Group 4)

Edition **A.**

Volume V—Propagation in non-ionized media (Study Group 5)

Edition **A.**

Volume XI.1—Broadcasting service (television) (Study Group 11)

Edition **R.**

Handbook for monitoring stations

Separate editions in **F, E, S.**

CCIR Handbook on satellite telecommunications (Fixed-satellite service)

Separate editions in **F, S.**

CCITT
International Telegraph and Telephone Consultative Committee

Handbook on rural telecommunications (GAS 7)

Separate editions in **F, E, S.**

Optical fibre system planning guide

Separate editions in **F, E, S.**

VIIIth Plenary Assembly, Malaga-Torremolinos, 1984

Red Book

Volume II

Fascicle II.4—Telegraph services—Operations and quality of service. Recommendations F.1-F.150 (Study Group I)

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Volume III

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Edition **A.**

Volume V—Telephone transmission quality. Series P Recommendations (Study Group XII)

Edition **C.**

Volume VI

Fascicle VI.1—General Recommendations on telephone switching and signalling—Interface with the maritime mobile service and the land mobile service. Recommendations Q.1-Q.118 *bis* (Study Group XI)

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Fascicle VI.9—Digital access signalling system. Recommendations Q.920-Q.931 (Study Group XI)

Edition **A.**

Fascicle VI.10—Functional specification and description language (SDL). Recommendations Z.100-Z.104 (Study Group XI)

Edition **C.**

FORTHCOMING PUBLICATIONS

(continued)

IXth Plenary Assembly, Melbourne, 1988

Blue Book

Separate editions in **F, E, S.**

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Fascicle I.1—Minutes and reports of the Plenary Assembly. List of Study Groups and Questions under study

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Fascicle I.4—Index of the Blue Book

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Fascicle II.4—Telegraph and mobile services—Operations and quality of service. Recommendations F.1-F.140 (Study Group I)

Fascicle II.5—Telematic, data transmission and teleconference services—Operations and quality of service. Recommendations F.160-F.353, F.600, F.601, F.710-F.730 (Study Group I)

Fascicle II.6—Message handling and directory services—Operations and definition of service. Recommendations F.400-F.422, F.500 (Study Group I)

Volume III

Fascicle III.1—General characteristics of international telephone connections and circuits. Recommendations G.101-G.181 (Study Groups XII and XV)

Fascicle III.3—Transmission media—Characteristics. Recommendations G.601-G.654 (Study Group XV)

Fascicle III.4—General aspects of digital transmission systems; terminal equipments. Recommendations G.700-G.772 (Study Groups XV and XVIII)

Fascicle III.5—Digital networks, digital sections and digital line systems. Recommendations G.801-G.956 (Study Groups XV and XVIII)

Fascicle III.6—Line transmission of non-telephone signals—Transmission of sound-programme and television signals. Series H and J Recommendations (Study Group XV)

Fascicle III.7—Integrated services digital network (ISDN)—General structure and service capabilities. Recommendations I.110-I.257 (Study Group XVIII)

Fascicle III.8—Integrated services digital network (ISDN)—Overall network aspects and functions, ISDN user-network interfaces. Recommendations I.310-I.470 (Study Group XVIII)

Fascicle III.9—Integrated services digital network (ISDN)—Internetwork interfaces and maintenance principles. Recommendations I.500-I.605 (Study Group XVIII)

Volume IV

Fascicle IV.1—General maintenance principles: maintenace of international transmission systems and telephone circuits. Recommendations M.10-M.782 (Study Group IV)

Fascicle IV.2—Maintenance of international telegraph, phototelegraph and leased circuits — Maintenance of the international public telephone network—Maintenance of maritime satellite and data transmission systems. Recommendations M.800-M.1375 (Study Group IV)

Fascicle IV.3—Maintenance of international sound-programme and television transmission circuits. Series N Recommendations (Study Group IV)

Fascicle IV.4—Specifications for measuring equipment. Series O Recommendations (Study Group IV)

Volume VI

Fascicle VI.1—General Recommendations on telephone switching and signalling—Functions and information flows for services in the ISDN. Supplements. Recommendations Q.1-Q.118 *bis* (Study Group XI)

Fascicle VI.5—Digital local, transit, combined and international exchanges in integrated digital networks and mixed analogue-digital networks. Supplements. Recommendations Q.500-Q.554 (Study Group XI)

Fascicle VI.6—Interworking of signalling systems. Recommendations Q.601-Q.699 (Study Group XI)

Fascicle VI.7—Specifications of Signalling System No. 7. Recommendations Q.700-Q.716 (Study Group XI)

Fascicle VI.8—Specifications of Signalling System No. 7. Recommendations Q.721-Q.766 (Study Group XI)

Fascicle VI.9—Specifications of Signalling System No. 7. Recommendations Q.771-Q.795 (Study Group XI)

Fascicle VI.11—Digital subscriber signalling system No. 1 (DSS 1), network layer, user-network management. Recommendations Q.930-Q.940 (Study Group XI)

Fascicle VI.12—Public land mobile network—Interworking with ISDN and PSTN. Recommendations Q.1000-Q.1032 (Study Group XI)

Fascicle VI.13—Public land mobile network—Mobile application part and interfaces. Recommendations Q.1051-Q.1063 (Study Group XI)

Fascicle VI.14—Interworking with satellite mobile systems. Recommendations Q.1100-Q.1152 (Study Group XI)

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Fascicle VII.1—Telegraph transmission. Series R Recommendations—Telegraph services terminal equipment. Series S Recommendations (Study Group IX)

Fascicle VII.2—Telegraph switching. Series U Recommendations (Study Group IX)

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FORTHCOMING PUBLICATIONS
(continued)

Fascicle VII.6—Terminal equipment and protocols for telematic services. Recommendations T.400-T.418 (Study Group VIII)

Fascicle VII.7—Terminal equipment and protocols for telematic services. Recommendations T.431-T.564 (Study Group VIII)

Volume VIII

Fascicle VIII.1—Data communication over the telephone network. Series V Recommendations (Study Group XVII)

Fascicle VIII.3—Data communication networks: transmission, signalling and switching, network aspects, maintenance and administrative arrangements. Recommendations X.40-X.181 (Study Group VII)

Fascicle VIII.4—Data communication networks: open systems interconnection (OSI)—Model and notation, service definition. Recommendations X.200-X.219 (Study Group VII)

Fascicle VIII.5—Data communication networks: open systems interconnection (OSI)—Protocol specifications, conformance testing. Recommendations X.220-X.290 (Study Group VII)

Fascicle VIII.6—Data communication networks: interworking between networks, mobile data transmission systems internetwork management. Recommendations X.300-X.370 (Study Group VII)

Fascicle VIII.7—Data communication networks: message handling systems. Recommendations X.400-X.420 (Study Group VII)

Fascicle VIII.8—Data communication networks: directory. Recommendations X.500-X.521 (Study Group VII)

Volume IX—Protection against interference. Series K Recommendations (Study Group V)—Construction, installation and protection of cable and other elements of outside plant. Series L Recommendations (Study Group VI)

Volume X

Fascicle X.1—Functional specification and description language (SDL)—Criteria for using formal description techniques (FDTs). Recommendation Z.100 and Annexes A, B, C and E. Recommendation Z.110 (Study Group X)

Fascicle X.2—Annex D to Recommendation Z.100: SDL user guidelines (Study Group X)

Fascicle X.3—Annex F.1 to Recommendation Z.100: SDL formal definition—Introduction (Study Group X)

Fascicle X.6—CCITT high level language (CHILL). Recommendation Z.200 (Study Group X)

Fascicle X.7—Man-machine language (MML). Recommendations Z.301-Z.341 (Study Group X)

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Conferences or meetings external to the ITU

date	place	title and organizer	further information from
1989			
5-8 June	Paris	COSPAS-SARSAT, satellite-aided search and rescue system *Centre national d'études spatiales (CNES)*	SOCFI 14, rue Mandar F-75002 Paris (France) Tel.: (33) 42 33 89 94 Telex: 214 403 Telefax: (33) 40 26 04 44
6-9 June	Melbourne	COMMUNICATIONS 89	John Gorton Overseas Trade Show Agencies Ltd 11 Manchester Square London W1M 5AB (United Kingdom) Tel.: 01-487 2983 Telefax: 01-487 3480
13-16 June	Seoul	WOCON-INFOR 89—World Conference on Information Processing/Communication	WOCON-INFOR 89 Organizing Committee KU Post Office Anam-Dong, Sungbuk-Ku Seoul 1 36-701 (Rep. of Korea) Tel.: (02) 924-7529 Telefax: (02) 922-7220
14-16 June	Amsterdam	EFOC/LAN '89—The Seventh European Fibre Optic Communications and Local Area Networks Exposition	IGI Europe, Inc. c/o AKM AG PO Box 6 CH-4005 Basel (Switzerland) Tel.: 41-61-691 51 11 Telex: 963 422 AKM CH Telefax: 41-61-691 81 89
17-22 June	Montreux	16th International Television Symposium and Technical Exhibition	International Television Symposium and Technical Exhibition PO Box 97 CH-1820 Montreux (Switzerland) Tel.: 41 21 963 32 20 Telex: 453 283 ITVS
12-14 July	Beijing	ICCT '89/SBOFC '89/SSL '89—International Conference on Communication Technology/Sino-British Joint Meeting on Optical Fiber Communications/Topical Meeting on Solid State/Semiconductor Lasers *China Institute of Communications (CIC) et al.*	Mr Zhong Yunruo Vice-President of China Academy of Posts and Telecommunications 40 Xue Yuan Lu Beijing (China)
17-19 July	London	The INMARSAT International Conference on Mobile Satellite Communications	Blenheim Online Ltd Blenheim House Ash Hill Drive Pinner, Middx HA5 2AE (United Kingdom) Tel.: 01-868 4466 Telefax: 018689933

date	place	title and organizer	further information from
18-21 July	Kobe	Seventh International Conference on Integrated Optics and Optical Fiber Communication—IOOC '89 *Institute of Electronics, Information and Communication Engineers et al.*	IOOC '89 c/o Business Center for Academic Societies Japan 3-23-18 Hongo, Bunkyo-ku Tokyo 113 (Japan) Tel.: 03-817-5831 Telex: 0 2722268 BCJSP J Telefax: 03-817-5836
24-27 July	São Paulo	1989 SBMO International Microwave Symposium *Brazilian Microwave Society (SBMO)*	Dr A. Octavio M. Andrade Chairman of the Steering Committee Instituto Mauá de Tecnologia Estrada das Lágrimas, 2035 09850 São Caetano do Sul São Paulo (Brazil) Tel.: (011) 4421900 (ext. 242) Telex: 1145234 AUAT BR
25-30 July	Medellín	EXPOCOM '89 *Empresas Públicas de Medellín*	Mr Juan Guillermo Penagos E. Gerente General Empresas Públicas de Medellín Apartado aéreo 940 Medellín (Colombia) Tel.: (574) 251 5253 Telefax: (574) 251 0581
28 August- 1 September	San Francisco	11th World Computer Congress—IFIP Congress '89 *International Federation for Information Processing (IFIP)*	11th World Computer Congress PO Box 18-P Denver, CO 80218 (United States)
28 August- 2 September	The Hague	Working Group of Postal and Telecommunication Museums *International Association of Transport Museums (IATM)*	Secrétaire IATM/AIMT c/o Musée des PTT suisses Helvetiaplatz 4 CH-3005 Berne (Switzerland)
4-8 October	Istanbul	Elenex Turkey 89—2nd Istanbul Electrical and Electronic Engineering Exhibition	Overseas Exhibition Services Ltd 11 Manchester Square London W1M 5AB (United Kingdom) Tel.: (01) 486 1951 Telex: 24591 MONTEX G Telefax: (01) 935 8625
4-9 October	Dammam	CCE '89—Computer, Communication & Office Technology Exhibition	Dhahran International Exhibition PO Box 7519 Dammam 31472 (Saudi Arabia) Tel.: 8337900/8337533 Telex: 803113 MAARID SJ Telefax: 8338010

date	place	title and organizer	further information from
6-10 November	Toulouse	Space Dynamics *Centre national d'études spatiales (CNES)*	Active Communication International «Le Communica» 2, rue Emile-Pelletier F-31082 Toulouse Cedex (France) Tel.: (33) 61 76 61 40 Telex: 532 442 F
15-17 November	Montpellier	11th IDATE International Conference—Service communication: moving toward internationalization of exchanges *Institut de l'audiovisuel et des télécomunications en Europe (IDATE)*	Marc Pasquet IDATE Bureaux du Polygone Rue des Etats du Languedoc F-34000 Montpellier (France) Tel.: (33) 67 65 48 48 Telex: 490 290 F Telefax: (33) 67 65 57 19
27-30 November	Dallas	GLOBECOM '89—Communications technology for the 1990s and beyond *IEEE Communications Society*	J. A. Crossett GLOBECOM '89 Technical Program Secretary Rockwell International 1225 North Alma Road, MS 448-140 Richardson, TX 75081 (United States) Tel.: (214) 996-6754 Telefax: (214) 996-7062
5-8 December	Hongkong	COMMTEL ASIA '89	4/F China Underwriters Centre 88 Gloucester Road Wanchai (Hongkong) Tel.: 5-756333 Telex: 64882 ASIEX HX Telefax: 5-8915347
12-15 December	Amsterdam	EuroComm 89	EuroComm 89 Europaplein NL-1078 GZ Amsterdam (Netherlands) Tel.: +31 20 549 12 12 Telefax: +31 20 46 44 69
1990			
14-17 January	Honolulu	12th Annual Pacific Telecommunications Conference (PTC '90)—Pacific telecommunications: weaving the technological and social fabric *Pacific Telecommunications Council*	Pacific Telecommunications Council 1110 University Avenue Suite 308 Honolulu, HI 96826 (United States) Tel.: (808) 941-3789 Telex: 7430550 PTC Telefax: (808) 944-4874

THE JOURNAL

One hundred years ago

News.

Telephones in Germany.—On 27 May, the number of subscribers to the Berlin telephone network reached 10 000, with 17 804 kilometres of telephone wire and 196 691 calls made daily. Whereas on 31 March 1882, the whole of Germany totalled only 11 telephone networks with 1884 subscribers and 3770 kilometres of wire, by 31 March 1889 there were 176 networks with 33 460 subscribers and 48 829 kilometres of wire. The main networks after Berlin are those of Hamburg, with 3574, Dresden with 1566 and Leipzig with 1235 subscribers.

(Archiv für Post und Telegraphie).

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* *

Telephone Congress.—The British Post Office and telephone companies have decided to hold a Telephone Congress to discuss technical and practical matters relating to the telephone service. The Congress will take place in London on 11, 12 and 13 July next. All telephone equipment and instrument manufacturers have been invited to attend.

It is proposed at the same time to hold an exhibition of telephone equipment and instruments. The members of the Organizing Committee are Messrs James Brand, Colonel Jackson, W. H. Preece, C. W. Fitzgerald, Owen Unwin, T. Fletcher, J. E. Kingsbury and Dr. J. Maier.

*
* *

Halifax-Bermuda Cable.—In its session of 9 May, the House of Commons, acting on a motion tabled by Mr. Jackson, signified its approval of a draft Convention between the British Government and the Halifax and Bermudas Cable Company for the laying of a cable between Halifax, Nova Scotia and the island of Bermuda and rejected an amendment whereby Dr. Cameroon proposed that the Government should assume responsibility for installation and maintenance.

According to information appearing in the press, the Government is proposing to allocate to this project an annual subsidy equivalent to 202 500 francs, to be paid only when the cable is in perfect operating condition and as long as it is kept in service. The Government reserves the right of priority of transmission for its correspondence at a reduced charge to be decided in due course.

The company must prove possession of a capital of not less than 2 500 000 francs within four weeks of the approval of the Convention by the House of Commons, while the cost of cable fabrication and laying shall not exceed the sum of 2 million francs.

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Transatlantic cable.—The press reports a plan to lay a direct cable between Ostend and America, independent of the already existing transatlantic cables.

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Cables between England and France.—The Anglo-French cables which had belonged to the submarine company have been bought out and are currently jointly operated by the French and British Governments.

*
* *

Hungary.—The Hungarian postal and telegraph service is now a department of the Ministry of Trade.

Journal télégraphique—June 1889

Second French mobile telephone network

In July 1987 the French PTT, as part of its deregulation programme and in order to boost mobile communications in France, launched a call for tenders for a second public mobile telephone operator. A group of companies headed by *Compagnie générale des eaux* was authorized to run the service and the *Société française du radiotéléphone* (SFR) was set up as the operating company. The existing mobile telephone network, *Radiocom 2000*, is operated by *FRANCE TELECOM*.

Based on an international tender, the network order was awarded in December 1988. *Alcatel Radiotéléphone* (ATR) was chosen as the main contractor with *Nokia* providing the technology.

Nokia will deliver all the mobile telephone exchanges (MTX) to the network and install and implement the first five. The first base stations were delivered directly from Nokia. According to the agreement, manufacture of the base stations is now being transferred to ATR in France.

System coverage

The network was officially opened by Mr P. Quilès, the French Minister of Posts, Telecommunications and Space on 30 March 1989. Initial coverage is limited to the Paris area. By the end of this year, the 10 biggest cities and the most important highways will be covered. This means that 50% of the French population will be within the service area of the system. By the end of 1990 all cities with more than 100 000 inhabitants and all major roads will have access to the system and by the end of 1991 over 85% of the population will be covered (figure 1).

The network has been planned for 100 000 subscribers, of which 30 000 will be in the Paris area. The network will then comprise approximately 4000 radio channels, 300 radio base stations and more than 20 *DX200* mobile telephone exchanges. The largest single MTX will be located in Paris to serve the 30 000 subscribers in that area. The other MTXs will be spread evenly throughout the country, each serving some 4000 to 5000 subscribers.

In the future, the capacity of the network will most probably exceed the present estimation of 100 000 subscribers. The network structure has been planned so that further extension will be easy.

System configuration

The network is based on the Nordic Mobile Telephone (NMT) concept which has been adopted by more than 20 countries in Europe, the Middle East and the Far East. In Scandinavia, the NMT systems have now reached an average penetration figure of 2.5%. The penetration figure for the present cellular system in France is 0.16%.

The French system is operating in the 450-MHz frequency band. It will, however, offer all the features of the advanced NMT system, usually available only in 900-MHz systems, such as the use of interleaved channels and battery-saving functions. With the help of these features the system supports the use of hand-portable in addition to vehicle-mounted telephones.

The allocated frequency band, 2×2.05 MHz is limited. For that reason it has been essential to use the allocated band as efficiently as possible. One indication of the achieved efficiency is the fact that the maximum capacity in the central Paris area is approximately 20 000 subscribers (4.6 erlangs/km; 0.025 erlang/subscriber). The efficiency of the French system in the Paris area is therefore higher than in any other cellular system.

Network planning

The advanced features of the NMT system have greatly contributed to the efficient use of the available spectrum of 2×2.05 MHz in the 450-MHz frequency band. Interleaving technique, i.e. splitting each channel of 25 kHz into two 12.5 kHz channels, doubles the number of available channels within the allocated frequency band from 81 to 162. The interleaved channels cannot be used in neighbouring cells but, using 10 groups

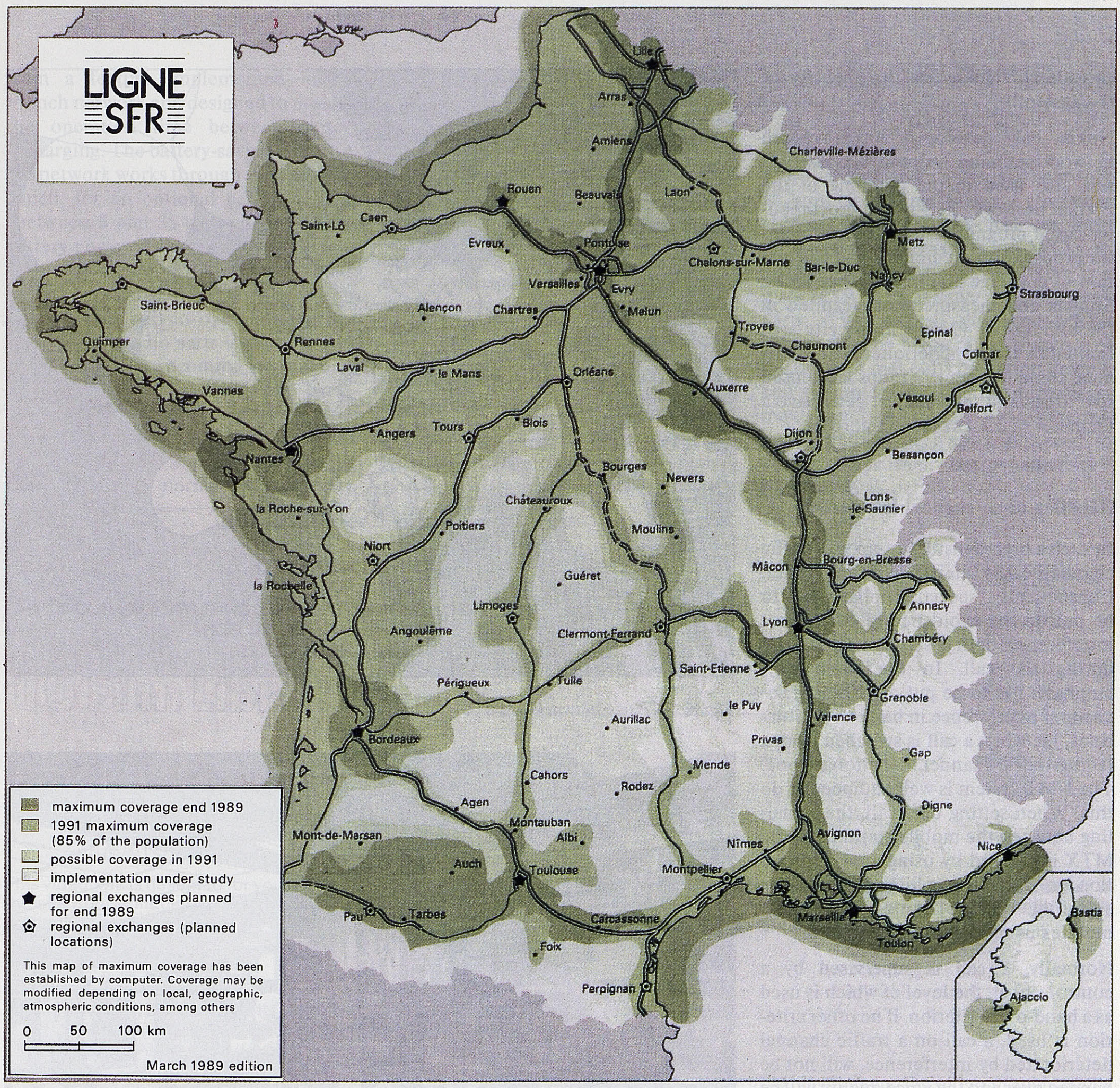

Figure 1—The French NMT network coverage

of 16 channels each, it is possible to make a frequency plan enabling the efficient reuse of the interleaved channels.

The most critical area for the radio network planning was, of course, Paris which has a very high car traffic density both in the city and on the circular road, the *Périphérique*, which surrounds it and has a diametre of 12 km.

Owing to the expected rapid growth in the number of subscribers in the Paris area, it was decided to build a small-cell system right from the beginning instead of following the conventional method of building large cells and later splitting them. The effect of the small-cell technique is that the same channel can be reused within a short distance, which

considerably increases the capacity of the system.

Nokia has developed an advanced network planning system (NPS), which was also used in the planning of the French network. NPS is a microcomputer-based program using digitized maps for propagation predictions and calculation of coverage and interference areas. Studies and measurements resulted in the building of 49 cells in the city area limited by the périphérique. Within this area, some frequency groups are reused five times and the smallest cells have a diameter of 1.5 km only (figure 2).

Handling of co-channel interference

In such a high-density system, the traffic channels easily interfere with each other. Consequently, special emphasis has to be put on the avoidance of co-channel interference, both at setting up a call and during the call. In the same way, emphasis has to be put on avoiding co-channel interference in hand-over situations, i.e. when a call is switched from a fading traffic channel to a stronger one. The NMT system is well equipped to do this. When setting up a call, the signalling between the mobile station and the MTX is secured by using area information on signalling, which distinguishes signalling coming from two different mobiles using the same frequency.

Normally, a call is supervised by a control signal, the level of which is used as a hand-over criterion. If no other criterion is used, a call on a traffic channel deteriorated by interference, will not be handed over and the voice quality will be severely degraded. The NMT system has overcome the problem by using the signal-to-noise ratio of the control signal as the second hand-over criterion.

Battery-saving function

Subscribers who carry their mobile telephones most of the time benefit greatly

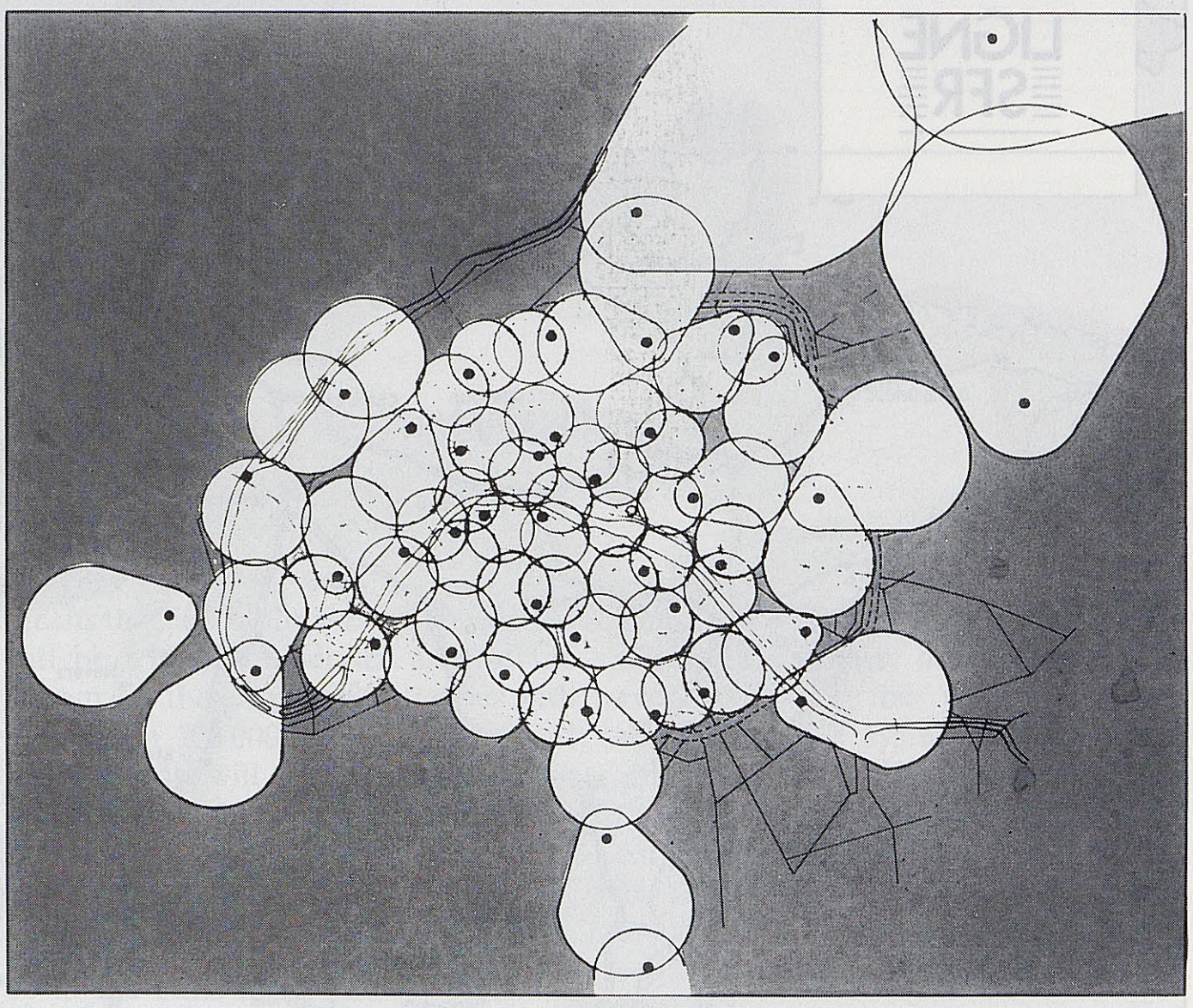

Figure 2—Paris network plan

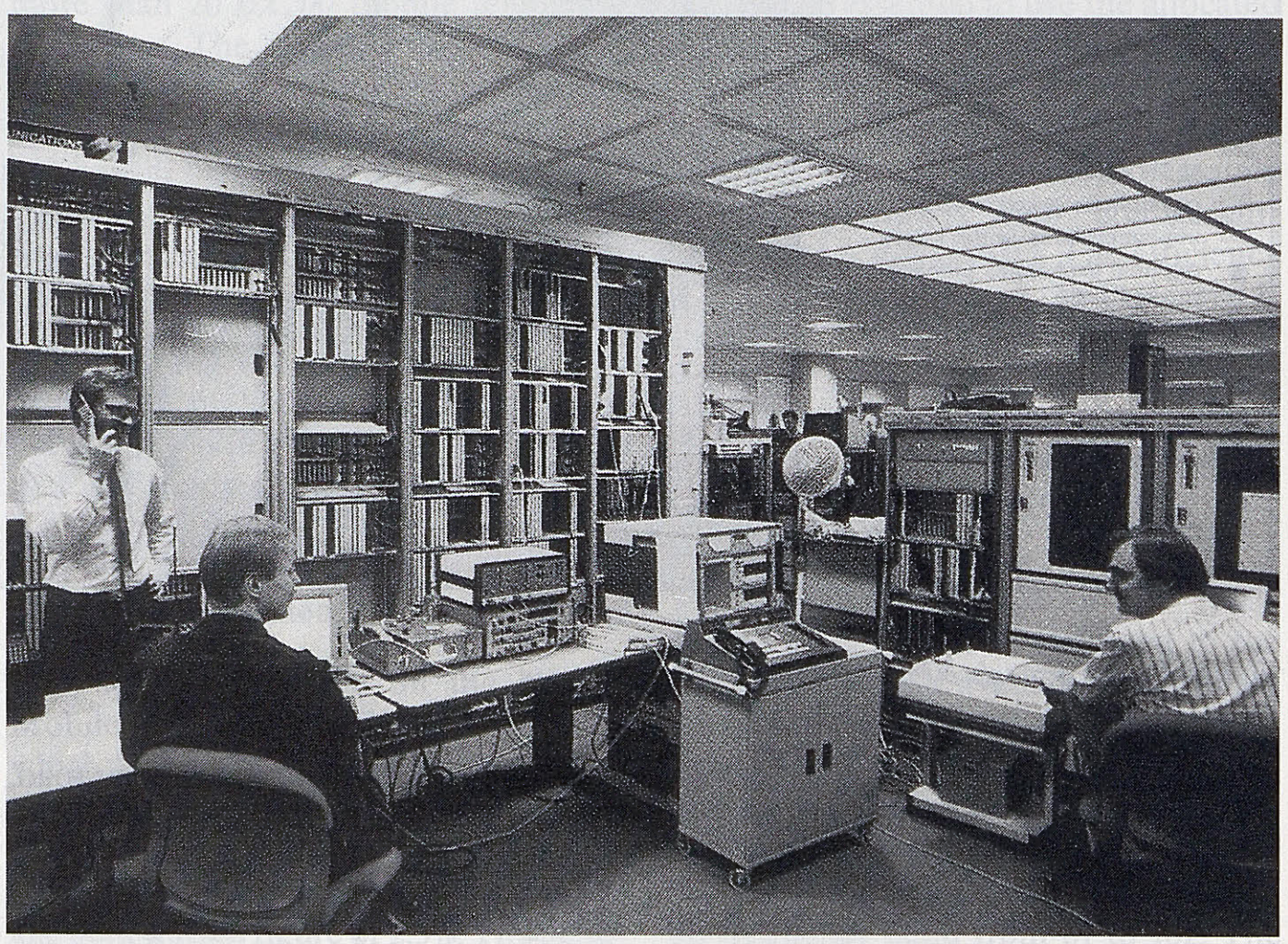

Figure 3—Main message switching centre in Paris

from a feature implemented in the French network and designed to prolong the operation time between battery recharging. The battery-saving feature of the network works through the exchange which, for an optional period of time (between 3 and 35 s), switches off the battery power of the hand-portable telephone which remains in operation but is not used for calling. The telephone is, in other words, still in operation but the power to the radio parts is shut off until activated by an incoming or outgoing call. This function prolongs the operation time for a hand-portable mobile telephone by more than 100%. In ordinary use this is enough to see the user through a normal working day, more than 10 hours, without battery recharging.

Exchange network

The large number of MTXs in the French network is a result of overall cost optimization of the network. Taking the cost of transmission lines into account the operator chose to build the network with more than 20 exchanges. With more exchanges and thus with shorter transmission lines, the operator has optimized total costs.

To manage such a large exchange network, Nokia provides a special operation and maintenance network, which makes it possible to monitor and control the whole network from a national monitoring centre in Paris.

The operation and maintenance network is built by using Message Switches (MSW). The network has six local MSWs each supervising 3 to 5 MTXs. In addition to the local MSWs, there is a main MSW in Paris supervising the large Paris MTX and all the local MSWs (figure 3). The hierarchical structure of the network makes its operation flexible and guarantees reliable alarm management. Input and output devices (terminals, printers, etc.) are centralized to MSWs. Thus their use is efficient.– *Nokia/SFR.*

ITU Film Library

ITU-424 **INVENTING THE FUTURE** (United States)
Electronic Industries Association (EIA). English. 1985
VHS/NTSC–15 minutes–colour

This videotape is designed for young people with the express purpose of making them aware of the vast career opportunities available in the electronics industry if they have sufficient mathematical and scientific backgrounds. This production is another step in EIA's programme to assure an adequate supply of trained personnel to meet the long-range needs of our growing industry.

Audience: general, technical.

ITU-425 **MIT STERN UND RAUTE** (With star and diamond) (Fed. Rep. of Germany)
A. H. Anders for Deutsche Bundespost. English. 1987
VHS/PAL, U'matic/PAL–16 minutes–colour

This film gives basic information on *Bildschirmtext*: its structural presentation, a description of its functions and the variety of applications it offers.

Audience: technical.

ITU-426 **TELEPHONES FOR REMOTE COMMUNITIES** (Australia)
Graham Cavanagh for Telecom Australia. English. 1986
VHS/PAL–47 and 35 minutes–colour

The two videos, "The choice of telephones" and "The provision of telephones" show some of the products and services available and what is involved in installing telephones. Telecom Australia has produced the videos to help aboriginal and islander communities determine their telecommunications requirements within the rural and remote areas programme.

Audience: technical.

THE ELECTRONIC

TOWARDS GLOBAL INFORMATION

ITU-COM 89 will attract thousands of visitors to Geneva during October 1989 to see the latest advances in electronic mass media applications, including broadcasting. Among these visitors will be some 800 broadcasting experts from the ITU's 166 member countries attending the CCIR Final Meetings between September and November 1989.

The International Telecommunication Union invites all companies, corporations and governments, to participate in the Exhibition with displays of their electronic mass media applications and services to the largest and best informed audience in the world. ITU-COM 89 will place particular emphasis on broadcasting-oriented applications and will provide an ideal opportunity for industry-leaders to open up new scope for their activities.

Three Symposia will draw together policy-makers, engineers, scientists, film and television producers, lawyers, users to hear and exchange views on the following themes:

- Policy Symposium: "Information Exchange in Tomorrow's World"
- Technical Symposium: "New Horizons in Electronic Media"
- Legal Symposium: "A Legal Mosaic for Global Communications".

With the Exhibition, Symposium and Book Fair, ITU-COM 89 will be the venue for meaningful and stimulating dialogue as well as demonstrations of electronic mass media applications for communications between nations, between communities and between individuals.

High Definition Television – the new challenge in broadcasting

High Definition Television (HDTV) is the most talked-about development in broadcasting. Its impact on the industry, on viewing patterns and on market penetration is still a matter for animated discussion although this is expected to be fully realized only in the 1990s. However, the future impact of HDTV has already been compared with that of colour television, because of the radical changes it would bring to the way in which broadcasts are produced, projected and received.

At ITU-COM 89, you will have an opportunity to see and compare the different schemes being developed in Japan, Europe and the United States. Displays will be arranged in both the Japanese and American National Pavilions and it is expected that the Eureka Project will also participate with a special stand.

Please send more detailed information on:

☐ ITU-COM 89

☐ Policy Symposium, 2-4 October 1989

☐ Technical Symposium, 4-7 October 1989

☐ Legal Symposium, 4-6 October 1989

☐ Book Fair, 3-8 October 1989

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Return to: International Telecommunication Union, ITU-COM 89 Secretariat, Place des Nations, CH-1211 Geneva 20, SWITZERLAND

ITU

1st World Electronic Media Symposium & Exhibition

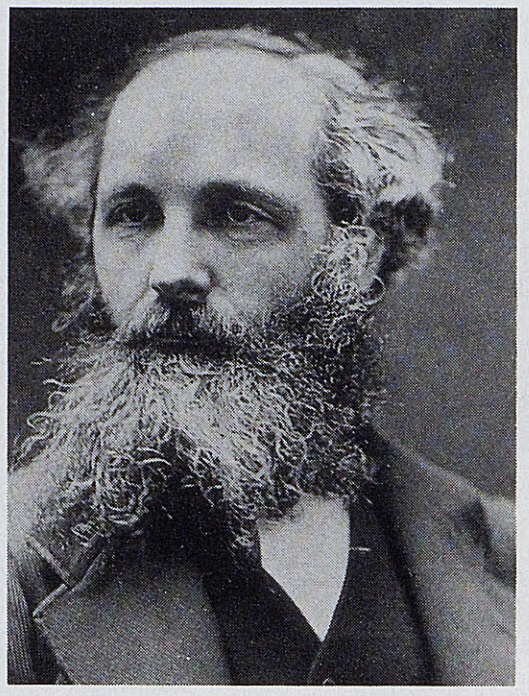
MEDIA EXPLOSION

GENEVA 3·8 OCTOBER 1989

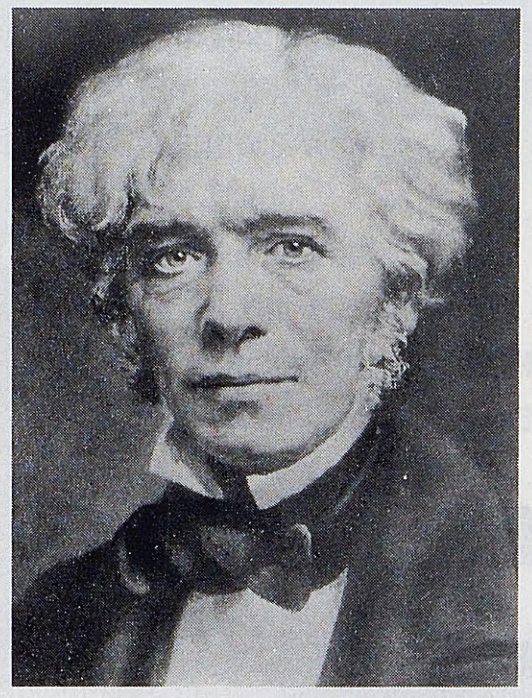
Looking back

A century ago Heinrich Hertz discovered electromagnetic waves

Professor Heinrich Hertz (1857-1894)



James Clerk Maxwell (1831-1879) predicted the existence of electromagnetic waves in 1864/1865 (Siemens)



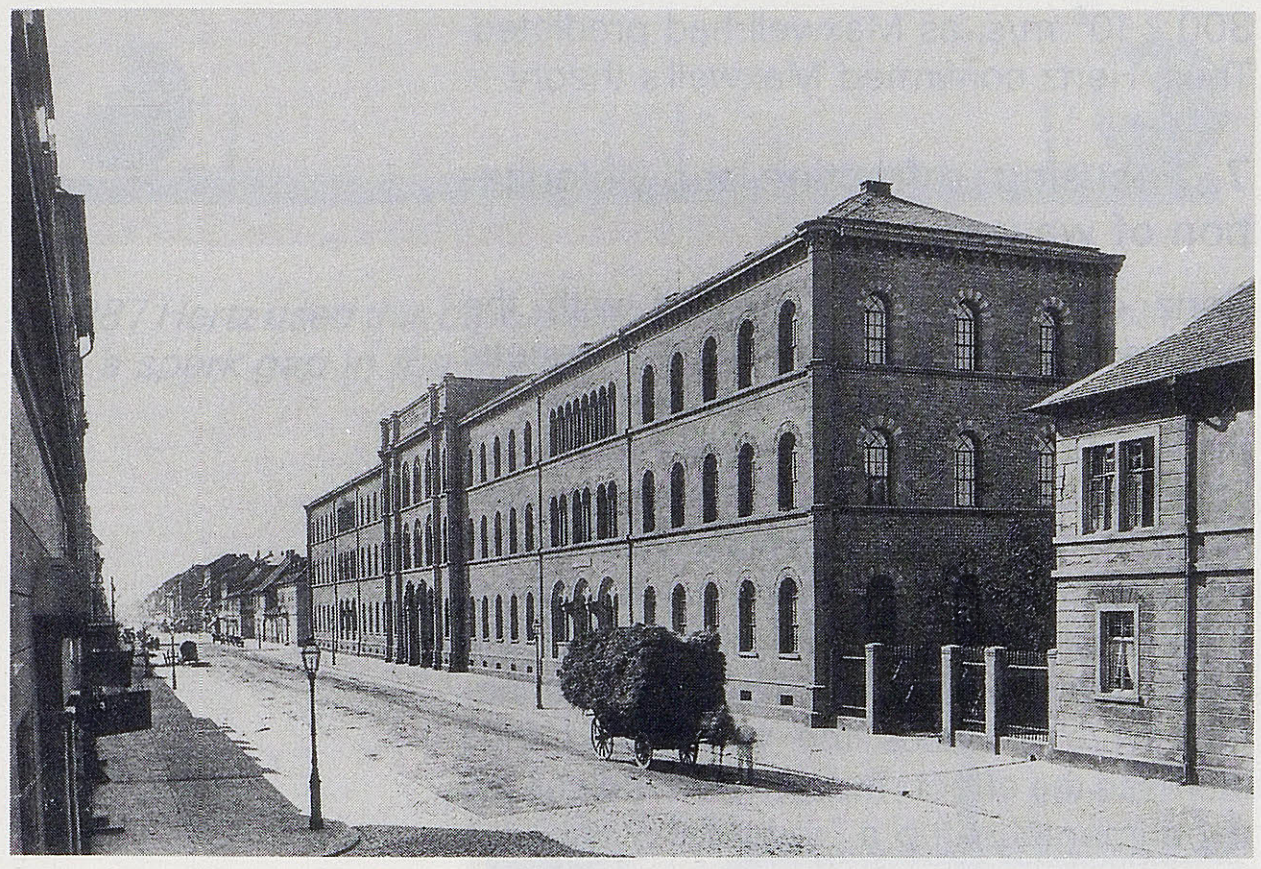
Michael Faraday (1791-1867) developed the theory of the electromagnetic field (Siemens)

1. Introduction

"At this Institute Heinrich Hertz discovered the electromagnetic waves in 1887/88" – this is the inscription on the bust of the world-famous German physicist standing in the University of Karlsruhe. Just over 100 years ago, on 13 December 1888, the Berlin Academy of Sciences published the final research report of Hertz entitled "On rays of electric force". Hertz's discovery is the basis for radio technology and for the later development of radio and television. How did this discovery come about and what did the scientists know about electric and magnetic fields over 100 years ago?

2. Faraday's theory of the electromagnetic field of 1837

Fifty years before Hertz began his research, the English physicist Michael Faraday (1791-1867) developed his theory of electric and magnetic fields. He assumed that, as a magnetic field exists around the poles of a magnet, an electric field should also exist around electric charges. From this analogy he derived the term "electric flux" that should also exist in non-conductors, that is in the ether. The electric flux, moving vertically to the magnetic flux, should have an effect in the ether.



The Karlsruhe Polytechnic where Heinrich Hertz discovered electromagnetic waves in 1887/1888

3. Maxwell predicted the existence of electromagnetic waves

Contemporary scientists were not capable of comprehending the epochal theory of Faraday. Thirty years later the Scottish mathematician and physicist, James Clerk Maxwell (1831-1879), recognized the interaction of the electric and magnetic fields and their propagation. He translated Faraday's theory into mathematical form with his well-known differential equations on the electromagnetic field. Solely on the basis of mathematical analysis, Maxwell predicted that the electromagnetic forces were propagated in the form of waves spreading out at the speed of light. He claimed light was only a "special form" of electromagnetic waves with extremely short wavelengths. Maxwell no longer lived when, in 1887/88, Hertz discovered the radio waves Maxwell had predicted.

4. Heinrich Hertz's youth and early studies

Heinrich Hertz was born in Hamburg on 22 February 1857. At school he proved to be unusually talented and interested in mathematics and natural sciences. He was also very adept in modelling and drawing and therefore decided to become a civil engineer. However, after a practical course and taking a few semesters, Heinrich Hertz realized that he preferred mathematics and natural sciences. He began his new studies in Munich but changed to the University of Berlin in 1878.

5. At the age of 23 Hertz became Doctor of Natural Sciences

In his fourth semester at Berlin, Hertz already began a series of experiments for his doctoral thesis "on the induction of rotating balls". Two weeks after completing the experiments, he took the doctoral examination. He passed it with *magna cum laude* which at that time was very seldom in Berlin. In March 1880 he was conferred the Doctor's diploma. After working as research and lecturing assistant for a little more than two years, Hertz wrote his habilitation "on the glow discharge" in 1883.

6. Hertz' discovery of electromagnetic waves

In 1885 Hertz was appointed professor of experimental physics at the former Karlsruhe Polytechnic, today the University of Karlsruhe. It was there that he started his

experiments with oscillations generated by electric discharges. As early as 1858 such oscillations had been observed in discharges over a spark gap. Did such oscillations emit electric forces into free space in the form of waves and how could this be measured?

For the reception of such possible waves Hertz built a so-called resonator. It was made of a wire circle with a gap of a few millimeters. When the resonator was close to a spark gap that produced electric oscillations and was excited to oscillate itself sparks jumped over the gap. At the adjustable gap Hertz had installed a small microscope to be able to observe the sparks in a darkened laboratory.

When Hertz succeeded in receiving oscillations with the resonator at 10 m distance from the spark gap, he was convinced that the electromagnetic waves predicted by Maxwell existed. After closer analysis Hertz realized that the waves were reflected from the walls which influenced the measurements. Therefore, he moved his equipment into a larger laboratory. During these experiments, the spark gap in the transmitting dipole was located between two 1.5 m wires that were stretched and had spheres attached to the ends. The spheres of 30 cm diameter functioned as capacity and increased the frequency of the waves emitted by these dipoles.

To improve the reflection of the waves, Hertz put a large metal plate on the wall. The reflection generated standing waves that made it possible to study precisely the nature of the waves and to also determine their length (about 9 m). By a comparison with the velocity of electricity in a wire, he determined that electromagnetic waves are propagated at the velocity of light, i.e. 300×10^6 m/s, as Maxwell had predicted. Thus, Hertz confirmed Maxwell's theory.

7. Focusing, refraction and polarization of waves

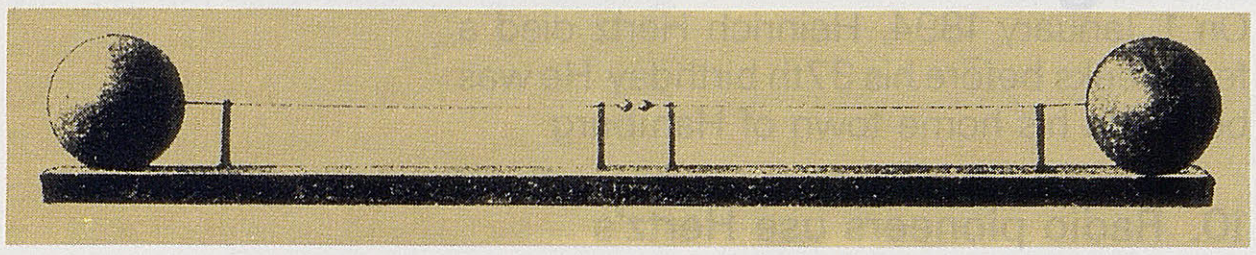
Hertz did not content himself with the success of discovering electromagnetic waves. He also wanted to examine whether the waves could be focused like light or be influenced by refraction. For these two experiments, he built parabolic reflectors. In one of them he put the spark gap in a transmitting dipole and in the other he put the spark gap in a receiving dipole. The reflectors were to focus the waves and thus increase the effect. Today we would call the experimental setup a "radio-relay link".

The experiment failed because the wavelength of 9 m was much too long for the small reflectors. Hertz recognized this mistake. On the basis of calculations he reduced the dipoles with the spark gaps to a length of 26 cm and removed the spheres from the ends. This way he generated a wavelength of 60 cm. Waves of this length were actually concentrated by the reflectors. That was the first proof of the optical behaviour of electromagnetic waves.

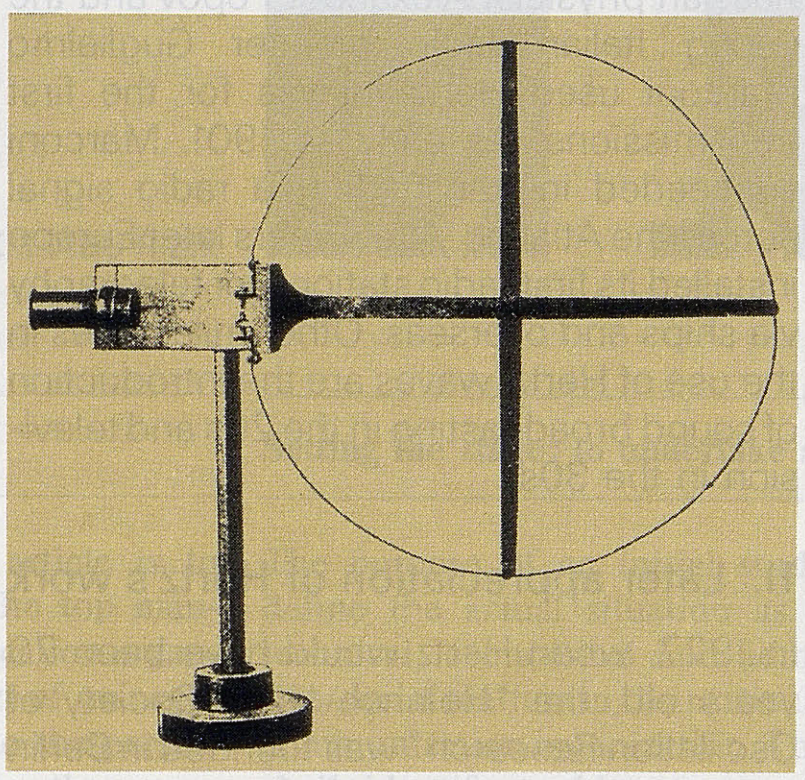
To analyse the refraction of waves Hertz had a prism made of hard pitch. It weighed 600 kg. This way he refracted the waves at an angle of 30°. With a wired grid Hertz analysed the polarization of waves. He determined that electromagnetic waves act linear like polarized light.

8. World-wide recognition

After publishing his final research report "on rays of electric force" on 13 December 1888, Hertz was conferred great recognition in Germany and abroad for the discov-



In 1887 Hertz used this dipole with spheres at the ends as capacities and a spark gap in the middle to generate waves of 9 m length

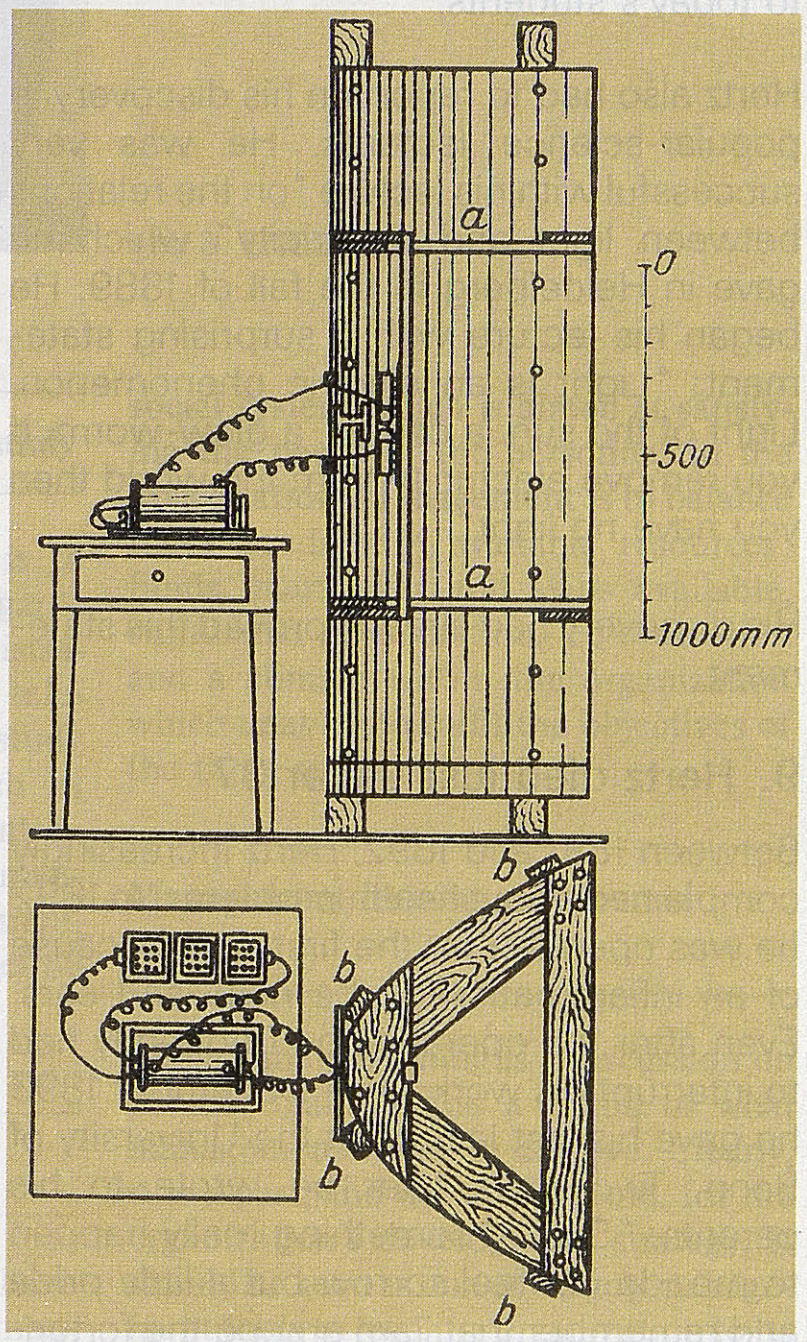


Resonator with spark gap with which Hertz discovered electromagnetic waves in 1887; on the left a small microscope to observe the tiny sparks

ery of electromagnetic waves and thus for the confirmation of Maxwell's theory. The Royal Society invited him to England and awarded him the Rumford medal.

In addition Hertz was awarded the following prizes:

- the Matteucci medal by the Italian Society of Sciences;
- the La Caze Prize of the Academy of Sciences in Paris;
- the Baumgartner Prize of the K. K. Academy in Vienna;
- the Bressa Prize of the Royal Academy in Turin;
- the Order of the Crown of the Prussian Government.



Transmitter with dipole for the 60 cm wave with parabolic reflector (drawing by Hertz, 1888)

The Academies of Sciences of Rome, Turin, Bologna, Vienna, Berlin, Munich, Göttingen and many other societies of scholars selected him as corresponding member. The Universities of Berlin, Göttingen and Bonn offered him professorships. In the spring of 1889, he chose the professorship in Bonn. There Hertz reconstructed the equipment for the experiments with electromagnetic waves. Hertz's experiments can still be demonstrated with the historical equipment to today's students.

Hertz also had to report on his discovery in popular-science lectures. He was very successful with his lecture "on the relations between light and electricity" which he gave in Heidelberg in the fall of 1889. He began his lecture with a surprising statement: "Light is an electric phenomenon. Light of the sun, a candle, a glow-worm. If you remove electricity from the world then you have no light".

His discovery had already proved this statement.

9. Hertz died just under 37

Between 1891 and 1892, Hertz increasingly complained about health problems. In 1892 he was operated for the first time because of an inflammation of the nose and ears. Even after the operation he frequently had to interrupt his work. On 7 December 1893 he gave his last lecture at the University of Bonn. Two days later he wrote to his parents: "Should something really happen to me, do not feel sorrow but a little pride and remember that I am among the fortunate who lived only for a short time and yet long enough".

On 1 January 1894, Heinrich Hertz died a few weeks before his 37th birthday. He was buried in his home town of Hamburg.

10. Radio pioneers use Hertz's discovery

Hertz was too much of a scientist to think of further developing his discovery for the transmission of signals or for the radio. But even before the turn of the century, the Russian physicist Alexander Popov and the young Italian radio pioneer Guglielmo Marconi used Hertz' waves for the first transmissions. As early as 1901, Marconi succeeded in transmitting a radio signal across the Atlantic. A few years later Europe installed its first radio stations for telegraphy via ships and overseas. Other milestones in the use of Hertz' waves are the introduction of sound broadcasting in the 20s and television in the 30s.

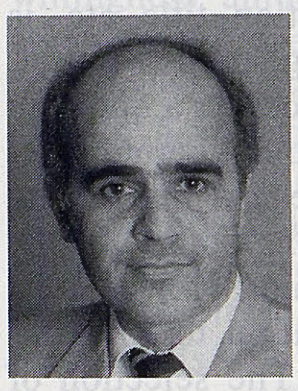
11. Later appreciation of Hertz's work

In 1927, when Hertz would have been 70 years old, the "Heinrich Hertz Society of Oscillation Research" was founded in Berlin upon the initiative and with the participation of the German *Reichspost*. In 1930 Germany proposed to the International Electrical Commission (IEC), the introduction of the term *Hertz* as the physical unit for frequency. The proposal was accepted. The abbreviation "Hz" for Hertz as indication of the frequencies on the scale of radio receivers used throughout the world reminds us of the great German physicist who discovered radio waves 100 years ago.

J. Kniestedt

Introducing management training in a telecommunication organization

by K. I. ABU RIZIK



and B. ENGSTRÖM

Introduction

THE objective of this article is to provide guidance to the top management of a telecommunication organization on the introduction of management training, as well as to the person in charge of a project in the same field.

The process described below builds on the experience gained from introducing management training and management training concepts in the telecommunication administrations of Costa Rica, Greece, Jordan and Portugal.

Management training is an ongoing process and the concepts have changed over time. The methods presented below include management by objectives, the use of information and decision-making systems, human resources development and leadership training. Management training has both short- and long-term objectives. The short-term objectives deal with priorities and define what should be done first.

Setting the stage: to undertake a study

The purpose of an initial study is to define the actual situation as regards technical, economical and administrative/social matters in the particular telecommunication organization. The study shall identify problem areas such as service level, cash flow, maintenance methods, quality in workmanship, human resources development, efficiency/productivity, and define priorities.

Definition of management

In setting the stage, it is essential to have a conceptual understanding of the management function. A telecommunication organization can be simplified and reduced to three main systems: a technical system with equipment and services to satisfy customer demands, an economical system to respond to the owners' requirement for profit, and thirdly, a social system which is aimed at satisfying the needs of the personnel in the organization. Management is to balance these needs with available resources: funds, manpower and skills available, stimulated co-operation, co-ordination and a climate within the organization which enables to fulfil the objectives of the three systems.

Management training: a dynamic process

Management training is a discussion on present realities and a vision of what management wants to achieve. Clearly, it is a part, and not a substitute, for the organization's development strategy. It should be seen as one of the top management tools to lead the organization to its objectives by helping in achieving the planned changes. The training function can include the responsibility of identifying training needs and methods. The structural changes to be introduced have to be headed by a special reorganization function. Management training means

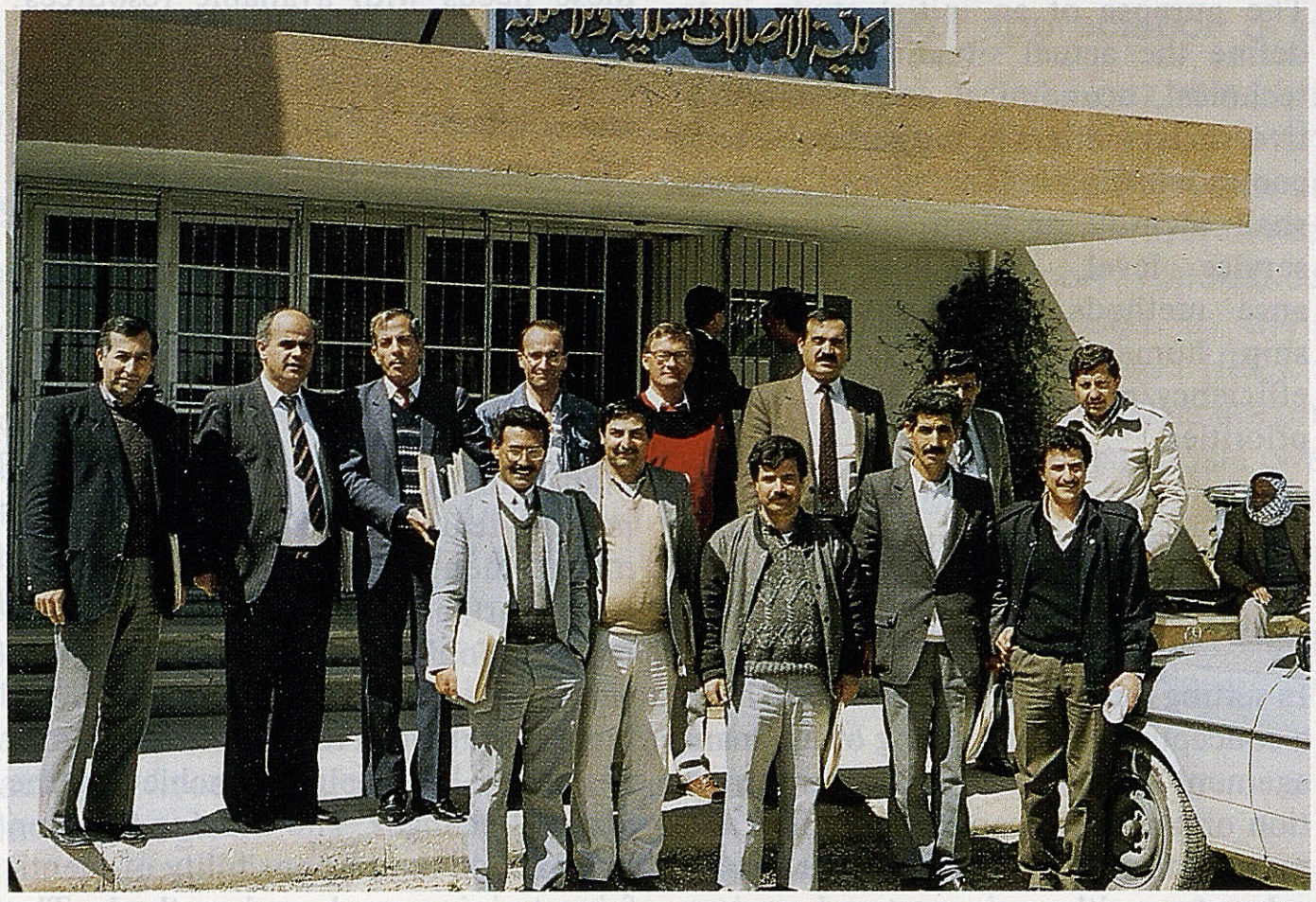
that the attitudes of the staff, that is of individuals, have to be modified at almost all levels of the telecommunication organization. This always takes time and needs special teaching techniques (case studies, discussions and persistence), together with patience.

Starting up: the management training project

The definition of a management training project should be carried out by a qualified analyst, preferably with operational experience, who has worked in this particular field. A good understanding of the cultural characteristics of the country and of the organization concerned is an asset. When defining the project, it is important that the managers in charge realize and understand that management training is not only a question of a number of courses to be conducted, but also a comprehensive system of training events as well as a process matter, which includes real case studies and follow-up activities. In the starting-up phase, objectives, action plans, time scales and budget are established.

Who trains who

Special teaching techniques are required in management training and the selection of suitable teachers is quite significant. In most cultures it is very important who, by virtue of position, title, etc., is explaining the management concept. Acceptance of the concept is a question of understanding and emotionally accepting the message and then being prepared to take action. Consequently, the management training project must give serious consideration to who will train different levels. The selection of lecturers and of methods must be done according to the tradition of the telecommunication organization. New methods must be tested and proved to be successful before being applied.



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Participants in a management training course at the Jordan Telecommunication Training College. Most participants are area managers in charge of maintenance and operations

Objectives and target group

It must be stressed that the training target group is made up of managers only, starting from the Director-General level down to first line management (foremen and supervisors). The objectives for each level have to be worked out in close co-operation. Of course this does not mean that top management may need a lot of training, but the analysis of training objectives must follow the whole line of command.

Management training has to be organized from the top. Certain managers can attend in-country and abroad training, outside the local programme. In this case, it is important that programmes are consistent and conform with ongoing local programmes. Many managers in the organization have acquired their education and training in management in national institutions or abroad. Applying this knowledge in their own organization is difficult: most of them have a view of what they want, but there might be a series of constraints which modifies behaviour. It is important that top management takes an active part in the process of change and then gives attention to and influences the objectives and contents of the training programme.

Ongoing organizational development

Most telecommunication organizations have ongoing development programmes which, among others, aim at changing the organization structure, introducing management information systems and ensuring quality. Network expansion is not included in such programmes. In order not to confuse or disturb ongoing activities, management training shall be well co-ordinated with current organizational development programmes. Indeed, such programmes can be used as case studies together with the participa-

tion of interested members, and as examples to explain and simplify the management training process. These case studies could improve team work, increase participation, create new and more efficient routines, etc.

Similarly, ongoing organizational development projects should take into account certain management training programmes, especially if these are related to top management. In such a case, it will be necessary that these development programmes be carefully coordinated and integrated in the training programme.

Recruitment of management training consultants

In many developing countries, management training is a new field. National universities and other commercial training institutes might have ongoing general management programmes, but the training concept for telecommunication organizations is, however, to some extent different to the general training programmes offered by such institutions. There are of course certain aspects that are applicable to a number of fields, among which telecommunication. A number of telecommunication organizations have to call upon a management training consultant in the initial stages. In some cases the assistance of the International Telecommunication Union (ITU) might be one of the solutions to launch management training. Recruitment raises one interesting question: what vision do the managers in charge have about management, i.e. what are their ideals? Before starting any recruitment, the managers have to formulate what criteria to apply in the selection process. It is possible that the impact of management training could change behaviour as well as ideals. It may take several years to establish a management training process and it is also possible that several training consultants will be involved before its completion. This fact should also be taken into consideration at the time of selection.

Initial phase of the training project

The initial phase of any project is to ensure that all parties involved have the same interpretation of the project objectives. No part of the project shall be pursued until there is acceptance and willingness among those involved to reach the set objectives. In other words, the principles have been set and all participants have agreed to follow them. There is always a number of persons who have personal reasons for not complying with the objectives agreed upon. At the initial stage it will be important to select participants who can see the objectives and are prepared to make the project a success. If the project has a good start and seems to be successful, it is likely to attract others.

It is crucial that the managers in charge take part in the initial phase. This is normally achieved if they are well informed from the beginning and are given the opportunity to influence and fully understand the objectives of the management training project. Furthermore, it is vital that managers fully understand and realize that management training is not only a few courses but a process, not limited to a few spectacular events.

First step: setting of objectives

Whatever management style is selected, the organization itself should have clear and well-defined objectives. Otherwise, the first step will be to establish accepted objectives. The first training activity might be to gather the top management group to consider objective-setting and the different ways to go about it. This does not go so far as to establish a complete set of objectives to cover a comprehensive picture of how the organization should work. Objective-setting aims at establishing well-accepted and realistic goals, describing ongoing efforts and giving a picture of future development. As many as possible of the existing formal and informal leaders of the organization should take part in this process.

It is also important that the objectives be formulated by the leaders themselves, so that they are recognized, appreciated and understood by everyone. This can take some time and involve many people. The process could of course be guided by some consultants, but participation from the leaders of the organization is essential. The winding up of this stage is disseminating the objectives set and ensuring that they become well-known in the organization. Objectives will always be modified in parallel with development (for instance on a yearly basis). Remember, the road to success is always under construction!

Next step: using management models

There can be different ways of describing the management function. Whatever philosophy is selected, the trainer must have a simple and understandable way to describe the workings of a telecommunication organization. The purpose of having selected instructional models is to help the trainee to understand the concept of controlling and steering (managing) the organization, through realistic examples and situations. Common to all of them is the fact that they include a way to measure efficiency and productivity. The resulting measurement figures can be called key figures (or service figures) and be used at different levels of the organization: at the top management level to account for the results obtained or at a supervisory level where key figures together with volume describe the activities of the organizational unit. This is a very practical

approach to describe management performance.

Definition of steering

To ensure that work or services will be carried out in a way that fits into the telecommunication organization, there must be a function in the organization that steers or controls it. Let us define steering (control) as:

- stating the objective of the organization;
- describing the present situation;
- identifying changes (diversions from objectives, plan or standards);
- discovering the reasons for the deviation from either the objectives, plan or execution of work;
- taking decisive measures in order to maintain balance between the following elements: objectives, planning, execution of work and outcome/evaluation.

In management training, steering will be one of the major subjects. There are nowadays many ways of describing how the steering process can be realized. The management information and decision-making processes all have in common to collect significant key figures and compare them with the set objectives or targets. The interrelation between these key figures must be understood. Decisions can then be taken on the basis of analyses of the key figures and judge ment. The management training process must include such techniques and use examples stemming directly from the telecommunication organization. Understanding the steering function is an essential part of the management training process and, by working with real cases, selected if possible within their own working environment, the participants will understand their organization and thus will be motivated to apply their new knowledge.

To convey this message, a number of lecturers have to be involved and should preferably be selected among knowledgeable managers under the guidance of a training consultant. Seminars, organized with the temporary assistance of internationally well-experienced and recognized managers, can be an important tool for top managers to master the changes needed.

Creating a management training team

A management training team has to be established and included in the training function. The functions of this team will be to:

- analyse the present role and behaviour of the managers;
- compare this present role and the one they are expected to play in the new situation which will result from organizational development programmes or from management training;
- define the management training needs.

Having in mind the functions of the management training team, the consultant has to work out the objectives to be attained taking into account the history of the organization and its anticipated development. The training consultant and the training team are to co-ordinate and facilitate the tasks to be undertaken rather than tell the managers what to do.

The recruitment and preparation of training team members can start under the guidance of the training consultant and the training project manager.

In an introductory stage it is always best if such a team is not too big (two to three members). What is essential for the whole project is the status of the team, along with the support the team members will be granted. This is something which has to be defined by the top management. The positive acceptance of new ideas and changes is very important to the success of the implementation phase. It is evident that the members of the training team can not cover all aspects of a telecommunication organization; they will co-ordinate and help with training events and programmes rather than act as teachers, especially at the beginning of the training process.

Guidelines for the management training team

As many of the subjects to tackle are new, there will be some uncertainty at the beginning as to what the different members shall do. The initial task of the training consultant will be to work out job descriptions for each member according to their education and experience. The team members are recruited in view of the priorities defined in the prestudy. Since they have to work closely with the actual managers, their day-to-day work schedule must enable them to come into contact with these managers and make themselves well-known, understood and even appreciated. It is also expected that team members will have to receive some support until the management training function has been defined and the organization has learned how to use it.

Defining training needs

One of the major tasks for the management training team is to define the training needs. Managers in general have an in-depth technical knowledge, but a limited one in administration and economics. Knowledge in these fields is often acquired through trial and error in the day-to-day work. The training team has to compare the present level of knowledge and the objectives of the organization, analyse the input, and arrive at the training programme to be developed. This programme, its objec-

tives and contents, are defined according to the ITU guidelines (CODEVTEL) for course development.

Managers as teachers

Before starting any of the courses of the programme, the team must find suitable persons who would be available inside or outside the telecommunication organization and use them as teachers if possible. The idea is to use knowledgeable and experienced managers as teachers in some of the essential subjects. This is one of the ways of involving the managers in the training of their successors. Furthermore, it stimulates teamwork and co-operation and being a teacher is the best way of learning!

Use of external management training institutes

A number of subjects can be taught by external educational institutes and the team will have to establish contacts with a view to co-operation with the facilities which exist in the country. It is evident that there will be certain areas such as basic economics or administrative courses available in these institutes. But in any case there has to be an adaptation to the needs of the telecommunication organization. This mutual exchange of ideas and information is strategically very important and will increase the interaction and enlarge the basis for further development within the country.

Priorities to certain levels

Experience from management training carried out at the international level over the last ten years has revealed among other things one interesting point: in many cases participants agree that management training is needed, but particularly for either their bosses or subordinates. There is always a tendency to push the problems to another level. In some cases, it can, of course, be that certain levels (for example the supervisory level or first-line management) have not received adequate training. If priority is now given to one level–let us assume the supervisory level–to encourage it to modify in their way of working, it will be necessary to make sure that such changes can be introduced. It is equally important that the supervisors of the staff trained be interested and support these changes. There must be consistency and trust between the various levels.

Examples of training courses

As already stated, top managers quite often have little knowledge about the social and economic matters of the organization. The following are examples of training courses for the management group:

- personnel rules and regulations and associated routines;
- instruction and information techniques;
- management models and use of key figures;
- analysis of performance and steering;
- quality control and assurance;
- customer service procedures and market concepts;
- planning function and procedures;
- personal planning and efficiency;
- basic economics and cost-effectiveness;
- use of computerized administrative systems;
- budgeting and accounting principles.

Conducting courses and methods to be used

One immediate problem when training managers is that they consider themselves so busy that they do not have time to take part in any training programme. Besides, they often have the impression that they know and can handle any situation. Surprisingly enough, they are often the ones who really need to meet others and get new information. One way of getting managers involved can be through short seminars and discussions on management. The management training team acts as "process consultants", and it is for the top management to take initiatives to achieve changes.

Cost/benefit analysis

Short-term evaluation of management training in the traditional cost/benefit analysis model is really difficult. If the management training programme is broken down to single courses and then analysed from case to case, it could be easier to handle. For example, how to evaluate improvement in team work or higher participation in decision-making? This is a difficult matter. On the other hand, it can be easier to evaluate improved cash flow or better designed and maintainable networks.

As in any training effort, course development and training implementation have a price. Course development, implementation and follow-up have to be calculated and included in the training budget. From the managers' point of view, the following should be said:

- investment in the most costly resource, that is staff, is essential if the best performance is to be

obtained; consequently it would seem appropriate to credit a percentage of all business achievements to training efforts;

- controls are necessary to ensure that training budgets do not get out of hand. Training must respond to business needs and must be properly applied to benefit the business. Managers should be called upon to justify expenditure against such criteria.

Performance appraisal

The responsibility of any manager is to make sure that he or she has someone to take over in case of sickness, leave, etc. Consequently, managers must also be assessors. When conducting management training, managers must also carry out appraisals, which can be done if the appraisal is limited to verify if specific knowledge has been understood. It is, however, impossible to verify the participants' leadership qualities during a course. These qualities must be tested and appraised in real situations. The appraisal of any manager must be the result of actions undertaken. Formal rank or educational merits may be included but handled with care.

Planned future activities

As already stated the starting point of the management training process can be on different levels depending on the level of development of the organization. The future management training process could concentrate on areas such as:

- material administration, material flow and logistics;
- organizational development and rationalization;
- computerization and computerized aids in different functions;
- investment calculation and sensitivity analysis;
- balance sheet analysis and financing;
- marketing and active sales promotion;
- corporate planning.

This list is not exhaustive, but must always be related to the situation in the telecommunication organization concerned. The above-mentioned subjects are aimed mainly at top and middle management. As mentioned earlier, training methods may be different (for example, on-the-job training, guided project work, investigation/reporting under guidance, etc.).

Company climate

The management training process is part of building up the "company's climate", that is to define the codes and values of the organization. It is unrealistic to expect managers to co-operate solely for the good of the company. People mostly co-operate for individual or mutual benefit. If a manager diverts resources or effort towards other objectives than those agreed, without reciprocation, this could be counter-productive because it would affect the manager's results or those of his section.

The company's climate is also made of several other elements: the support and assistance managers give one another, the ability to take decisions, the blame cast on others when something goes wrong, the fact of not trying to find the faults and mistakes which are made, but correcting them and continuing progress, the trust in one another and the delegation of authority and responsibility, the creation of the "one team" that motivates and rewards hard work and quality achievements in the telecommunication organization. Together with present management knowledge and a true sense of co-operation, the build-up of a prosperous company's climate is the ultimate goal of the management training process.

(Original language: English)

Authors

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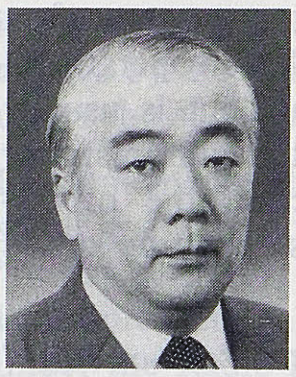
Since 1979, Mr Engström has been in charge of international management training at the Swedish Telecom Training Centre in Kalmar where he has been involved in introducing and executing management training programmes in Portugal and Costa Rica. He has also worked as an ITU expert for the implementation of management training in collaboration with the management of the Jordanian Telecommunications Corporation.

Challenges to the amateur radio service



by S. HARA, *JAIAN*

Introduction

THIS article describes three problems to be considered internationally on behalf of the amateur radio service. First, it is desirable to unify the standards for entering amateur radio, in anticipation of there being someday a world-wide acceptance of each administration's amateur licence. Second, transmissions of those non-amateur stations which operate out-of-band in the amateur allocations must cease so as to protect the frequency bands assigned to amateurs, through the International Amateur Radio Union (IARU) Monitoring System in co-operation with administrations. And finally, the IARU member societies need to make presentations to their administrations to favour a better understanding of the amateur radio service and appreciation of its value to each administration.

Unifying the standards

To become an amateur radio operator, sometimes called a "ham", an appropriate licence, issued by the national telecommunication authority, must be obtained. As the Radio Regulations of the International Telecommunication Union (ITU) stipulate in Article 32, Section I, paragraph 2736, "Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station".

The amateur radio operator's qualifications may be grouped into various categories according to the technical and operational level and scope. The precise grouping and the testing procedures naturally may vary from country to country.

Radio waves, once emitted, follow physical laws which are quite well understood, and they spread over the surface of the Earth regardless of international boundaries. This is one of the reasons why it is desirable to have common standards for the amateur radio service, with common operational and technical levels of competency which are based on the international Radio Regulations. However, whilst Member administrations of the ITU generally adhere closely to the international frequency allocations for the amateur radio service as agreed on at ITU conferences, each country has its own system of testing amateur operator qualifications based

on its own interpretation of what standards the amateur radio operators should meet. There are, unfortunately, no unified standards common to all countries.

The test subjects are not much different from one country to another. They are basically three: Morse code, technical radio knowledge, and knowledge of the Radio Regulations that govern the operation of amateur radio stations. The content of each subject often seems to be quite different from country to country, however, and so we end up with an amateur radio licencee in one country who may have a somewhat different level of technical proficiency than an amateur operator in another country.

The licence does not necessarily limit the amateur radio to operate in his own country. He can use his amateur radio station in other countries, upon suitable application, if these countries have adopted a reciprocal agreement allowing the amateur stations of each one to operate in the other's territory. There are dozens of these agreements in effect. Furthermore, some member countries of the European Conference of Postal and Telecommunications Administrations (CEPT) have already adopted a common licence system, whereby the licence of an amateur in one CEPT administration is automatically valid within another participating country, without further application. This is part of the growing effort made by countries throughout the world to provide for some sort of an international amateur radio licence, or the universal acceptance of the amateur radio licence issued by each country. For the ultimate success of such effort, however, it is necessary that the qualifications for an amateur licence and the standards for entry into amateur radio, be at an equivalent level in all countries. In this way each administration will accept more readily the licence issued by another administration.

Harmful interference

The amateur service and the amateur-satellite service are allocated certain so-called amateur bands. These are relatively narrow frequency segments of the radio spectrum which have been allocated either exclusively to the amateur service or shared with some other service. On these bands, amateur radio operators sometimes experience harmful interference from stations of other services: these operate in amateur frequency bands either accidentally or intentionally.

Accidental interference most often results from a technical or an operational fault. This kind of incident is usually resolved as soon as the administrator under whose jurisdiction the off-frequency radio station is operating knows about the problem.

Intentional operation "out-of-band" generally occurs under a provision contained in paragraph 342 of the Radio Regulations, which states that "Administrations of the Members shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations... or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations".

Usually, stations operate out-of-band because of their inability to find a clear channel within the allocations provided by a competent World Administrative Radio Conference. Nevertheless, their operation in an amateur band does cause harmful interference, and it becomes the responsibility of the amateur radio operators to document this harmful interference and properly report it.

Part of the solution to this problem lies in the IARU Monitoring System which is another volunteer effort undertaken by radio amateurs all over the world.

The Monitoring System is intended to:

- document those radio signals that intrude and cause harmful interference to amateur stations;
- properly report the incidents so that action can be taken to remove the offending signals.

For the system to function efficiently and effectively, there has to be good co-operation between the amateur radio operators and their telecommunication administration. Complaints of harmful interference are effective only when they are filed through official channels in a designated fashion. For an individual amateur to contact the administration of an offending station is not appropriate. The request for relief from harmful interference must be filed by the administration representing the station experiencing the interference. Radio amateurs have the valued co-operation of many administrations in this effort, but more help is needed. In turn, it is up to each member society of the IARU to expand the organization of the Monitoring System and to train volunteers who would monitor intruding signals.

Achieving a wider appreciation of the amateur service

Over a period of many years it has been demonstrated through independent studies that the amateur radio service can be of value to those administrations which support it. Given this assumption, three objectives need to be implemented:

- to provide continuing support for the amateur radio service, particularly in terms of adequate frequency allocations and favorable regulations that will encourage its growth;
- to facilitate the process by which individuals qualify for an amateur radio licence, so that the privilege be denied to a person who is not qualified;

– to establish the necessary standards and procedures through which there can eventually be an amateur radio licence issued by each administration which is valid world-wide.

How can these goals be achieved? First of all, the administrators in all the countries should understand the history, current situation, and future aspirations of the amateur radio service. There should be a close relationship between the IARU member society and the telecommunication officials in the respective country. This would be an effective way to open up the administrators' field of view not only on the domestic scene but also on global horizons. There could be a variety of settings in which the administrators are shown how amateur radio stations are operated: they might even be asked to have hands-on experience with amateur radio communications. If necessary, forums could be held presenting relevant information about the amateur radio service. These efforts would be beneficial not only to administrators but also eventually to the amateur operators.

To achieve some form of internationally recognized amateur radio licence naturally requires a great deal of consideration. In this respect the steps already achieved by the CEPT and the Inter-American Telecommunications Conference (CITEL) countries can be instructed.

Much assistance and guidance can be offered to those who will accept the help. First and foremost, the IARU will do all it can to help in any aspect of amateur radio. For instance the administrators can be offered workshops and other educational opportunities to understand better the amateur radio service and its administration, history and current situation. As an example, such a course in amateur radio administration is now offered by the IARU from time to time, under the sponsorship of the ITU.

It is inevitable that amateur radio be sometimes considered as just another "hobby". But it is more than a hobby: it is an internationally recognized service under the Radio Regulations and there are reasons for this. Radio communications, amateur or otherwise, have had a technical and experimental aspect since the very beginning of wireless telegraphy, and amateurs have contributed significantly to the developmemt of radio-related technology. In times of natural disaster, radio operators have provided a powerful and essential means of communication, contributing much to the welfare of mankind. Whenever these contributions made by the amateur radio service are explained and analysed in concrete terms, the amateur radio service is seen in its true light, and its value is appreciated.

(Original language: English)

Author

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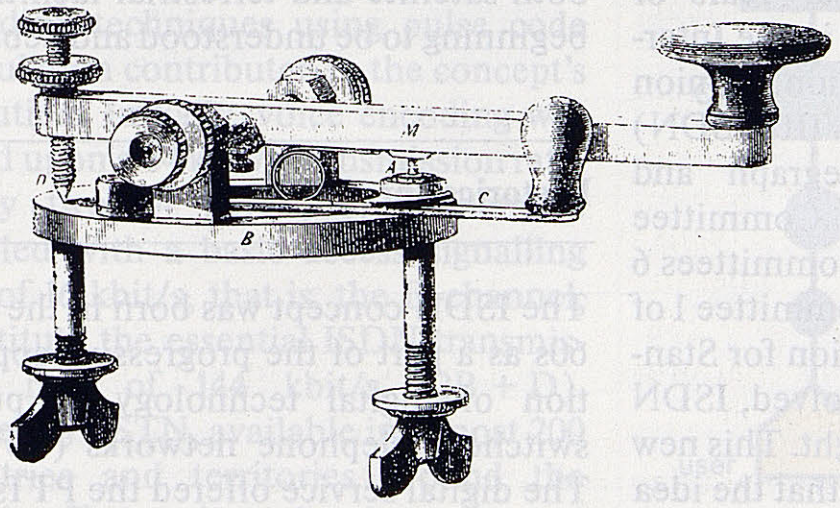

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120 years of technical information
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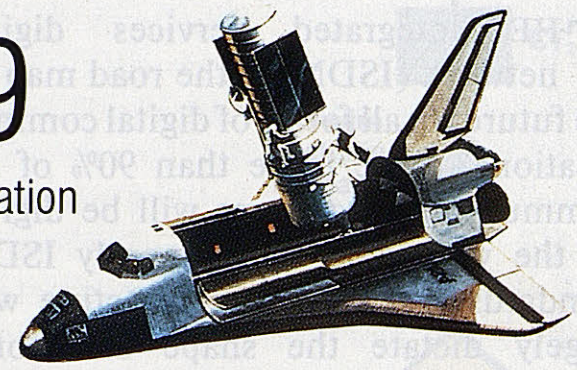

INTERNATIONAL TELECOMMUNICATION UNION ○ CH-1211 Genève 20 (Switzerland)

ISDN services via satellite and terrestrial means

by J. N. PELTON

Introduction

THE integrated services digital network (ISDN) is the road map to the future for all forms of digital communications. Since more than 90% of all communication systems will be digital by the year 2000, consequently ISDN standards and system architecture will largely dictate the shape and form of global communications in the 21st century. ISDN is, therefore, a mega-telecommunication issue and as such, it is probably the world's best kept trillion dollar secret.

ISDN's enormous importance is only gradually being understood. Years of work have been carried out in the International Telecommunication Union (ITU) by Study Group XVIII (ISDN) of the International Telegraph and Telephone Consultative Committee (CCITT) and within Sub-Committees 6 and 21 of Joint Technical Committee 1 of the International Organization for Standardization (ISO). As it evolved, ISDN has been put into the spotlight. This new prominence does not mean that the idea is new. In fact, ISDN was conceived a quarter of a century ago and is only now beginning to reach maturity. Just why and how ISDN will be implemented on both satellite and terrestrial facilities is beginning to be understood and debated.

Historical profile

The ISDN concept was born in the mid-60s as a part of the progressive application of digital technology in public switched telephone networks (PSTN). The digital service offered the PTTs and other public communication carriers three very appealing characteristics: enhanced quality, economy, and flexibil-

ity. The first characteristic is achieved when a signal is digitally encoded to overcome degradation due to the transmission medium. As regards economy, early studies suggested that digital services offered significant advantages since a substantial quantity of interface equipment in the telephone exchange could be eliminated. Finally, digital service also provides flexibility in the transmission of voice, data, video, and other services with equal ease. These new digital services were beginning to increase substantially in the early 70s but their potential growth was stunted by bandwidth limitations inherent in a 4-kHz voice channel which characterized the analogue transmission and exchange facilities typical of that time. ISDN tends to remove the telephone as the basic common denominator of telecommunication planning and substitutes the basic digital bit.

The term ISDN was first defined within the CCITT in 1972. It referred to a network providing end-to-end digital connectivity for a range of services. It also used the idea of a totally open network with universally available and standardized "ports" that can plug in everywhere. The concept has since then evolved from the existing telephone networks of countries undergoing changes due to the introduction of totally new digital technology in the switching and transmission equipment. Similarly, the introduction of voice encoding techniques using pulse code modulation contributed to the concept's evolution. Initially, voice encoding was based upon a 64 kbit/s transmission rate. Today two 64 kbit/s, or B-channels coupled with a basic access signalling rate of 16 kbit/s, that is, the D-channel, constitute the essential ISDN transmission rate of 144 kbit/s (2B + D). Currently PSTN, available in almost 200 countries and territories around the world, offers universal voice access to almost 750 million telephones around the world. ISDN is the network which will progressively provide a similar universal access for not only voice but data, facsimile, video, text, and other services as well.

In the industrialized countries, the evolutionary nature of the ISDN concept has been a matter of economic practicality considering the vast telephone infrastructure already in place. The primary emphasis, however, has been the enhancement of services rather than a simple replacement of existing equipment. This evolutionary approach has also merit for most of the developing countries, although in some instances where analogue facilities do not exist presently or where they are very limited, the direct installation of digital facilities could allow a direct leapfrog to ISDN capabilities.

Part of the reason why the spotlight has been put on ISDN standards is that these are now at a critical stage and could "tilt" towards space or terrestrial telecommunication facilities. If ISDN standards in particular were to favour terrestrial hierarchically-switched transmission paths, the satellite services could be adversely affected. Users of telecommunication services have also expressed concerns about ISDN prices, duplication of private network facilities already in place and compatibility between protocols for different digital systems already in place particularly the *IBM SNA* network architecture.

Today, considerable progress has been made. Unworkable ideas such as "zero-second" delay and hypothetical reference connection (HRX) with the same noise and interference "budgets" for satellites and terrestrial links have been laid aside for more reasonable albeit (though) still demanding standards. The waiting period for practical ISDN is now almost over. When the last CCITT study period was closed, perhaps 75 to 80% of ISDN standards issues were resolved and agreed.

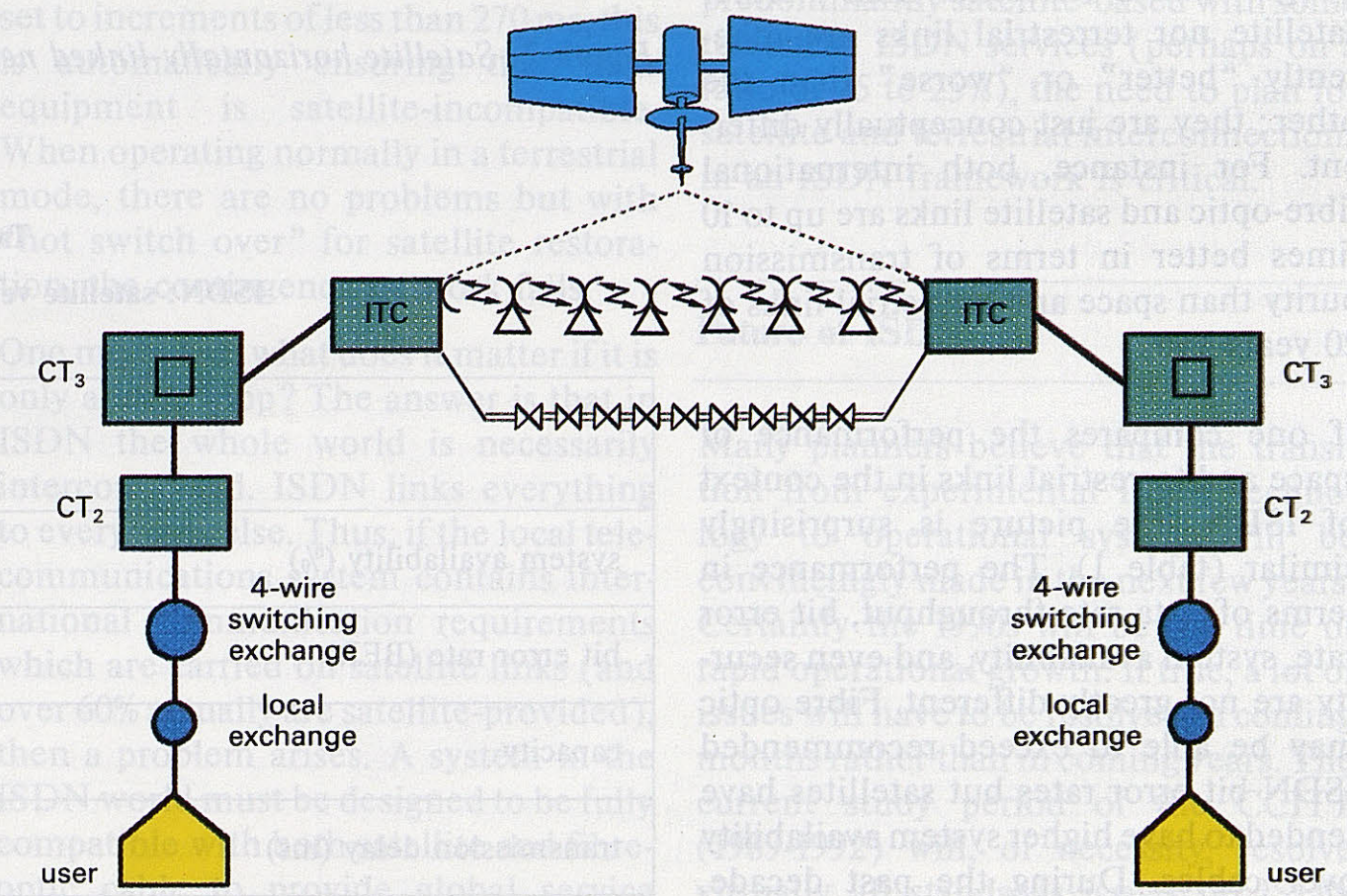

Figure 1—Hierarchical telecommunication network

Even so, basic issues remain to be solved. Particularly with satellite uplinks now close to or at the user's premises, the basic architecture of a satellite link and a fibre-optic link are further apart than they have ever been. Bypass of terrestrial switching networks tends to make today's space and ground networks way apart—conceptually almost night and day.

Figures 1 and 2 illustrate the difference in the transmission path for space and ground telecommunications. For HRX space and ground links, for example, the issues are totally different. Fibre-optic terrestrial links require little allowance for noise and interference with most of the budget for network degradation required for the hierarchical signalling and switching systems and the local distribution links as shown in figure 1.

In the case of satellites, however, it is increasingly true that the hierarchical switched network can be totally bypassed (figure 2). Thus, the satellite link which covers a 71 572 km route requires a larger share of the noise budget than a terrestrial link. Neither satellite nor terrestrial links are inherently "better" or "worse" than the other; they are just conceptually different. For instance, both international fibre-optic and satellite links are up to 10 times better in terms of transmission purity than space and terrestrial links of 20 years ago.

If one compares the performance of space and terrestrial links in the context of ISDN, the picture is surprisingly similar (table 1). The performance in terms of data rate throughput, bit error rate, system availability, and even security are not greatly different. Fibre optic may be able to exceed recommended ISDN bit error rates but satellites have tended to have higher system availability over cables. During the past decade, there have been, for example, over one million circuit-hours of international submarine cable outages, almost all of which was restored on the system of the International Telecommunications Satellite Organization (INTELSAT).

The key and continuing concern has been that of transmission delay. A satellite in geosynchronous orbit is located 35 786 km above the Earth—a full one-tenth of the way to the Moon. At this altitude, the pull of the Earth's gravity is 50 times less than at the Earth's surface.

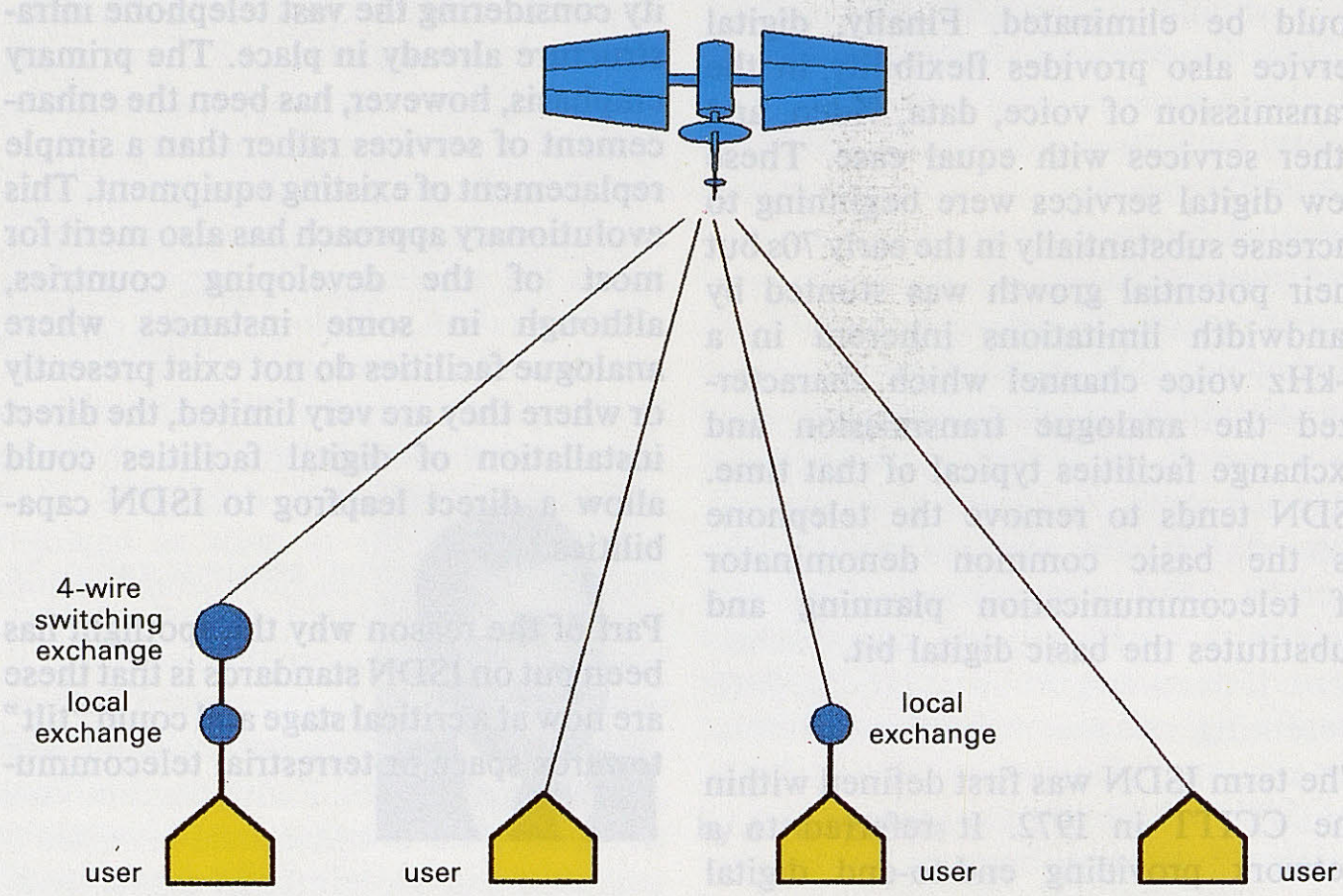

Figure 2—Satellite horizontally-linked network

Table 1

ISDN: satellite versus fibre-optic cable

	advanced satellite	advanced fibre-optic cable
system availability (%)	99.98	99.98
bit error rate (BER)	10^{-7}-10^{-11}	10^{-7}-10^{-11}
capacity	1-3.2 Gbit/s	840 Mbit/s-2.5 Gbit/s
transmission delay (ms)	270	under 50
typical end-to-end network transmission time (ms)	350-1000	200-1400

Thus, at an orbital speed of 10 990 km/hour, a satellite can be positioned exactly above the same point over the Earth and never change its orbit characteristics. This special geostationary orbital configuration, known as the "Clarke Orbit" (in honour of Arthur C. Clarke) cannot be achieved naturally at a higher or lower orbit. This is advantageous in that the transmission path is quite constant and varies very little. Thus, only a modest amount of buffering is needed to protect against pathway length changes when earth stations have higher or lower look angles to the satellite or there is some build-up of satellite inclination, that is, movement north or south of the equatorial plane.

The disadvantage is of course the transmission delay of some 270 ms. This problem has, however, tended to be overstated. For video applications, a 270 ms delay is easily accommodated and is not a user concern. Most new video systems, whether digital or analogue, will continue to be satellite-based because of the natural advantages of single point-to-multipoint distribution.

For voice communications, the problems of delay and echo are often confused. In modern satellite communications, advanced digital echo cancellers remove most echo characteristics. Extensive subjective testing with thousands of uses have verified that delays of up to 450 ms are considered quite satisfactory when good echo cancellers are in operation. Serious consideration was given in 1988 to modifying CCITT Recommendation G.114 on delay to increase the acceptable level from 400 to 450 ms. Although the standard was retained at the current level of 400 ms, the supporting information on acceptable delay by users is much better documented.

Finally, there is the issue of delay associated with data transmission. This is perhaps more complicated because the applications are so diverse. Advanced protocols for delay compensation have been developed that introduce multiple forward error correction loops into the total end-to-end network and minimize the delay problems associated with the satellite link. Many sophisticated computer link users have successfully established networks between the United States, Canada and Europe using INTELSAT business service (IBS) or ISDN-compatible *Super IBS*. These protocols allow extremely high throughput and error control. No known digital or analogue video, voice or data application is incompatible with satellite operations. No ISDN standard-making service has yet suggested otherwise, although there have been certain suggestions that the advanced high-speed packet switching service associated with future 155 Mbit/s broadband (B-ISDN) service could require delays of less than 270 ms.

As a "real world" matter, it can be confidently stated that satellite transmission, coaxial cable, microwave relay, and fibre-optic cable are all fully capable of meeting ISDN requirements. The problem is that some manufacturers of ISDN have overlooked certain issues. If, for instance, fault detection timers are set to increments of less than 270 ms, this is automatically ensuring that their equipment is satellite-incompatible. When operating normally in a terrestrial mode, there are no problems but with "hot switch over" for satellite restoration, the contingency network fails.

One might ask, what does it matter if it is only a local loop? The answer is that in ISDN the whole world is necessarily interconnected. ISDN links everything to everything else. Thus, if the local telecommunications system contains international communication requirements which are carried on satellite links (and over 60% actually are satellite-provided), then a problem arises. A system in the ISDN world must be designed to be fully compatible with both satellite and fibre-optic cable to provide global service otherwise ISDN becomes exclusive rather than all-inclusive if the terrestrial network fails and the traffic is then shifted over to a satellite-based restoral system which too will promptly fail. In short, in the ISDN world, every component of the network, including restoration networks, must all be designed to work together at all times.

Concepts such as "terrestrial A-channels" and satellite-based "B-channels" with different delay allowances could prove self-defeating to the basic ISDN concept of global interconnection.

ISDN offers great potential for both developed and developing countries to have fully interconnected and integrated systems. This option is worthy of careful protection as it could assist in the more rapid development of third world countries. Since it is likely that ISDN services in the Organization for Economic Co-operation and Development (OECD) countries will be predominantly terrestrial-based with some satellite services (perhaps on a ratio of 80 to 20%) and that ISDN in developing countries using INTELSAT's time-division multiple access (TDMA), intermediate data rate (IDR) and IBS services for domestic, regional and international links will be predominantly satellite-based with some terrestrial ISDN services (perhaps on a ratio of 75 to 25%), the need to plan for satellite and terrestrial interconnections in an ISDN framework is critical.

Future of ISDN

Many planners believe that the transition from experimental ISDN technology to operational system will be convincingly made in the next few years. Certainly the 1990s will be the time of rapid operational growth. If true, a lot of issues will have to be resolved in coming months rather than in coming years. The current study period of the CCITT (1989-1992) will, of necessity, resolve virtually all standards issues on ISDN including even wideband ISDN for transmission rates up to 155 Mbit/s. Even so, there are some unresolved

ISDN issues and concerns that may remain beyond standards issues that must be addressed. These are:

- ISDN and the developing world

Which pockets of ISDN capabilities may exist in the business sections of the capitals in developing countries? Terrestrial-based ISDN will not come to most developing countries for a number of years. For many of these countries, INTELSAT ISDN-compatible services (TDMA, IDR and Super IBS) will be the only way to obtain international ISDN services. This almost certainly suggests that ISDN planners must take this "fact" into account in their network planning.

- ISDN and private networks

The key element of ISDN design is universal access from "world-wide standardized ports". Even so many corporate networks for a variety of reasons such as security, special network functions or cost may well choose to create "special ISDN networks" which are operated as "closed" or private systems.

The point is that ISDN exists at several levels. At one level, it is a set of technical standards and specifications which ensures a high level of quality, reliability and compatibility. At another level, ISDN is a set of service capabilities starting with the 2B + D (or 144 kbit/s) voice and data capability. ISDN transmission capabilities will move to wideband ISDN that allows a 155 Mbit/s digital pipeline to deliver high definition television (HDTV), regular television and videoconferencing. In time this will also provide picture phone or even "digital compressed movies" to be down-loaded in a period of 5 min or less.

At the final conceptual level, ISDN is a blueprint for an integrated global electronic communications system. While this basic concept is important and in part achievable, it seems most likely that total interconnection and compatibility will not be achieved soon, certainly not in the 20th century and certainly not without solving issues such as a global standard for digital HDTV. More recent concerns such as the spreading of "computer viruses" via large data networks will also tend to limit enthusiasm for totally universal open networks.

- ISDN and the cable versus satellite issue

Clearly those are some inherent advantages of satellite technology (television and radio broadcasting, mobile services, and large interactive networks among others). Just as certainly, fibre-optic cables also have some impressive capabilities such as multiple gigabit/s throughput, high cost efficiency for heavy streams of traffic which are several hundred kilometres in length, high-quality services and limited transmission delay. ISDN, however, should not be seen as a means for promoting or undercutting a particular transmission technology. Clearly, the complementary nature of the two basic wideband transmissions is too vital in terms of restoration, global interconnection and multiple routing to risk "strategic" or pre-emptible standards-making in the ISDN arena. Possible new ISDN services such as user-dialled transmission selection and "near-zero second" delay could easily produce counter-productive results in terms of limiting both satellite service options and full restoral options.

In time, ISDN will be upgraded to higher service levels such as 10^{-8} or 10^{-9} bit error rates and system availability of 99.99%. These upgrades, however, should reflect real service needs and not be done so that developing countries are shut out of the global ISDN system. In short, for telecommunication growth to continue to be strong, vibrant and truly global, a well co-ordinated mix of advanced digital satellites and fibre-optic cables operating in the 100 Gbit/s range will be required as of the start of the 21st century. Vigorous new developments of space and terrestrial telecommunications technology will make this possible.

Conclusion

ISDN is not a four letter word. It is a blueprint to the electronic communications system of the future. If ISDN standards are developed equitably and effectively, they will stimulate the development of both satellites and fibre-optic cables. Terrestrial networks will remain hierarchically-switched and "vertical" in nature while satellites will become even more directly linked to the user and thus be more "horizontal" in nature. It will be critical for "universal" ISDN standards to accommodate these widely difficult communication architectures. If ISDN does manage to bridge the gap between satellites and fibre optics it means at the very least that ISDN, by the 21st century, will be able to bridge the world.

(Original language: English)

Author

Joseph N. Pelton is currently Director of INTELSAT Special Studies and Projects. He has been involved with satellite applications since 1965 and is the author of a number of articles and reviews, as well as four books – one of which (*Global Talk*, 1981) was nominated for the 1982 Pulitzer Prize for distinguished non-fiction by an American author and was awarded the 1982 Literature Award by the American Astronautical Society. Mr Pelton was the first President of the Society of Satellite Professionals and has played a leading role in the organization of the Arthur C. Clarke Foundation of the United States.

Mr Pelton now serves as editor of the *Journal of Space Communications and Broadcasting*. Furthermore, he also serves as an organizing member of the Board of Directors of the International Space University (ISU) at the Massachusetts Institute of Technology (MIT) as well as Chairman of the Strategic Planning Committee of the ISU. In the broadcasting field, he serves as a member of the Board of Trustees of *WETA*, the Washington, DC, public broadcasting station.

Golden Antenna 91: an audio-visual kaleidoscope of telecommunications in the 1990's

Designed to encourage world-wide production of high-quality films and videotape recordings covering all fields of telecommunications and electronics, the **6th International Film/Video Festival on Telecommunications and Electronics** (Geneva, 8-15 October 1991) provides a unique opportunity for scores of entries submitted by ITU Member governments and by the world telecommunications industry to compete for the much prized "Golden Antenna 91".

Organized within the framework of TELECOM 91, the "Golden Antenna 91" Festival is open to all ITU Member governments, whether or not they are actively participating in TELECOM 91, to world-wide commercial enterprises which are taking part in the Exhibition, to scientific or industrial organizations which participate in the work of ITU's International Consultative Committees, and to the United Nations family of organizations.

CATEGORIES

The five categories of entries are:

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For further information, please write to:

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International Film/Video Festival
Public Relations Division
International Telecommunication Union
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(For several entries, this form may be photocopied)

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To be detached and returned by 30 April 1991

Participant's name in full:
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Full address: _____

Person in charge: _____

Title: _____

Telephone: _____ **Telex:** _____

Telefax: _____ **Teletex:** _____

Title of production: _____

Original language(s): _____
(If more than one, indicate which version preferred for showings):

Purpose and intended audience: _____

☐ General ☐ Technical ☐ Semi-technical

Producer/Director*: _____

Category of production (see Art. 7): _____

Type of production: ☐ 16 mm ☐ 35 mm ☐ VTR

VTR format: ☐ U'MATIC ☐ VHS ☐ BETAMAX

Standard: ☐ PAL ☐ SECAM ☐ NTSC

Duration: _____ min **Year:** _____ ☐ **Colour** ☐ **B&W**

Special projection requirements, if any (see Art. 4): _____

Synopsis (about 70 words) (see Art. 15): _____

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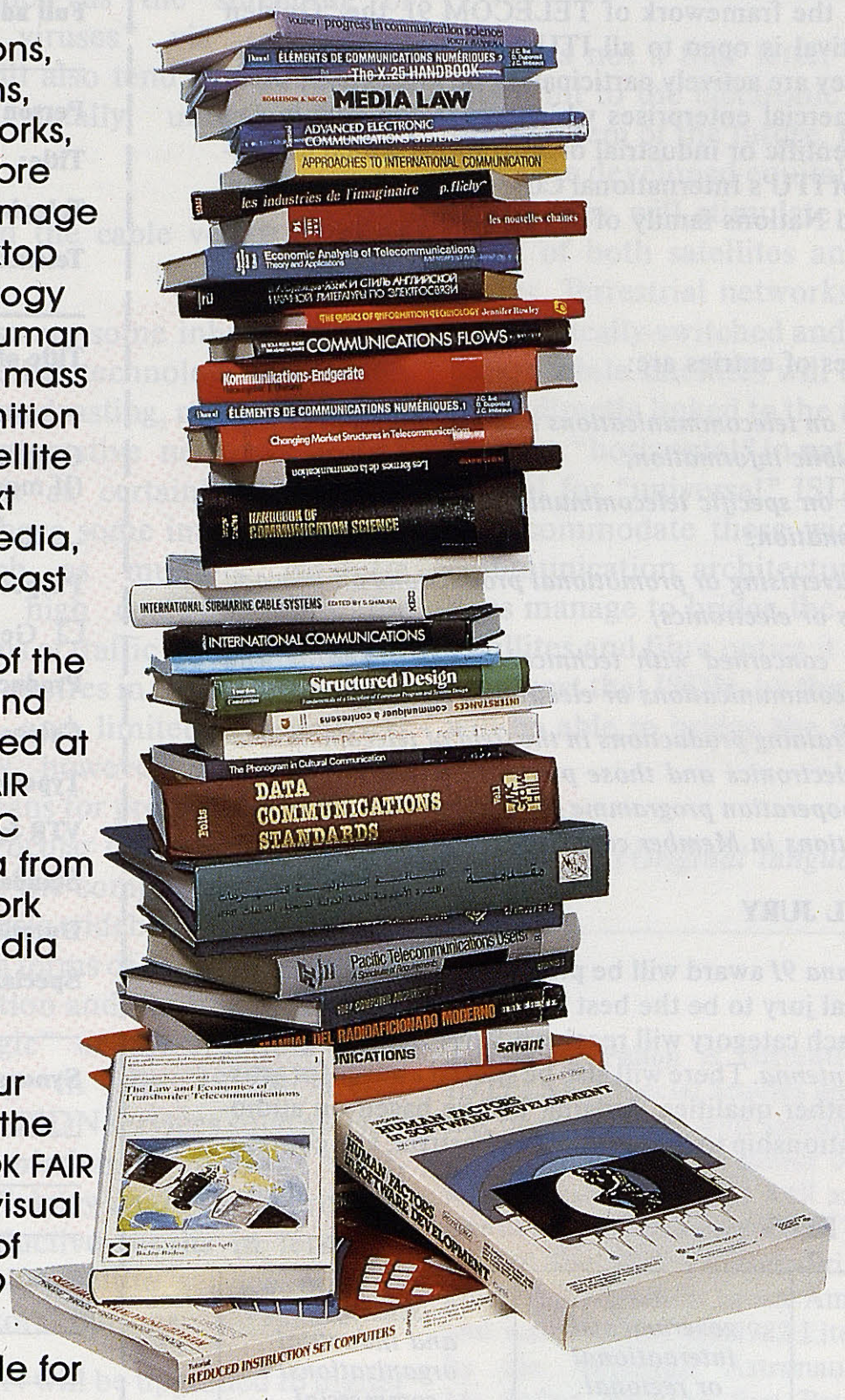

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News

Test now for 1992

☐ A milestone has been reached with the issue of the first Europe-wide telecommunications test certificate by Teleprove, British Telecom's independent test house.

A specialist supplier, Fivemere Ltd, has been awarded the first certification under the new pan-European testing scheme, which gives reciprocal acceptance in 18 European countries and forms part of the European Community's strategy towards the pan-European market of 1992.

Teleprove was the first test centre in Europe to obtain recognition for testing to the new European standards, known as *Normes Européennes de télécommunications* (NET).

The NET standards flow from a joint initiative by the European Commission and the European Conference of Postal and Telecommunications Administrations (CEPT) aimed at harmonising telecommunications standards. The CEPT's memorandum of understanding on NETs has so far been signed by 18 countries, including the United Kingdom.

These standards are the first step towards mutual acceptance of apparatus approval throughout Europe and the ultimate removal of trade barriers in the telecommunications industry.

The first NETs cover attachments complying with the X.21 (1984) and X.25 (1984) protocols.—*British Telecom.*

Strong demand predicted for digital cordless telephones in Europe

☐ The new generation of European cordless telephones, now under development for 1991, is promised a bright future by a study recently carried out for the European Commission.

The *DECT* (digital European cordless telephone) system should allow pocket-sized telephones to be used at home, at work or near "telepoints" in public places, throughout the Community.

The results of the study (carried out by Arthur D. Little), recently presented to an audience of manufacturers and operators in Brussels, predict a multi-million ECU market allowing sufficient economies of scale for DECT handsets to sell for 200-250 ECU at today's prices. Sales should be as successful as for consumer products such as video recorders, the study concludes.

For business users, the system will provide communications ranging from telephone calls to radio links with computers, allowing electronic equipment to be relocated without expensive rewiring. The in-office "cordless PABX" system should attract an annual market of 1000 million ECU by 1995.

The home cordless telephone market in Europe is also predicted to reach 1000-1500 million ECU by 1995, with domestic users contributing a further 200 million ECU to the telepoint market.

Office workers are often away from their desks, but will not be out of touch either in their office buildings or on the move. Although the telepoint system allows outgoing calls only, mobile staff could be alerted by a paging facility in the handset. The business telepoint market is expected to be worth a further 1000-1500 million ECU in 1995.

The benefits of the DECT system derive from its multi-purpose ability to cater for the three main categories of use—at home, at work and through telepoints—leading to much better commercial prospects than if separate systems were developed. The costs are also lower than for cellular systems, such as those used for carphones.

To provide the capacity to meet the high demand expected in large urban areas, advanced techniques and a sufficiently large frequency spectrum are required, the study points out. The frequency allocation should be found in or near the 900 MHz band to be used for the pan-European digital cellular radio-telephony system scheduled for 1991 onwards, the study recommends, in order to optimize technological developments.—*European Commission.*

Pointel: the portable personal telephone

☐ *Crouzet SA* (France) is preparing to supply *FRANCE TELECOM* with equipment for an experiment in the first half of 1989.

The package offered by Crouzet comprises pocket handsets weighing about 100 g, public base units and the associated management system. This cordless telephone uses CT2 digital technology.

890108

Handset and base unit of the CT2 digital telephone station

It can be operated from distances of up to 200 m from one of the public terminals which FRANCE TELECOM is planning to install throughout the country.

This digital cordless telephone will become operational by 1990.

Crouzet set up a co-operation agreement with the British firm Shaye Communications Ltd in September 1988.

Crouzet, France's leading manufacturer of public telephone equipment, has sold 120 000 public telephones in ten years, including 25 000 card-operated sets.—*Crouzet.*

Australian government partnership for United Kingdom firm

☐ An agreement has been concluded between GEC Plessey Telecommunications—GPT (United Kingdom) and the Australian government. The partnership-for-development agreement will cover research, development and export.

The agreement is the first to be signed with a telecommunications company under Australia's "Partnerships for Development" scheme which, in the information technology industry alone, will result in research and development expenditure of 1 billion Australian dollars and exports of over 4 billion in the period to 1994. In return for commitments over a seven-year period, GPT will be relieved of specific import offsets obligations when dealing with the Australian government.

Under the partnership, GPT has committed to increase the Australian-based research and development programme within the next seven years to not less than 5% of Australian sales. It must also achieve an export/import ration of 50% and these exported products must have Australian-manufactured content of at least 70%. The major benefits to GPT are increased commercial opportunities utilizing a wide range of Australian talent and expertise, and

increased flexibility in its trading relationship with Commonwealth and State Government purchasing authorities.—*Stromberg-Carlson.*

Teleglobe upgrades digital satellite transmission

☐ Teleglobe Canada has upgraded its digital satellite transmission facilities in Mill Village (Nova Scotia) enabling twice as many calls to be carried to similarly equipped earth stations in Europe. The improvements were made on Teleglobe's time division multiple access/digital speech interpolation (TDMA/DSI) terminals with technical support from the Spar Communications Group.—*Teleglobe Canada.*

China agreement

☐ China has signed a general contract with *Ericsson*, which is expected to lead to contracts worth 200 million Swedish kronor (31 million United States dollars) in the first stage.

The agreement was signed by *Ericsson Australia* for the *Ningbo Post and Telecommunications Bureau* and the *Ningbo Telephone Company* in the Zhejiang province, on the east coast of China.

Ericsson will supply 12 digital *AXE* exchanges, including local subscriber lines as well as local trunk lines, to the Ningbo area, located about 300 km south of Shanghai. The contract also covers power and transmission equipment and the establishment of a local training centre.

The AXE equipment will be manufactured at Ericsson's design and manufacturing facility in Melbourne (Australia) and will be delivered and installed during 1990-1992.

The firm has already installed two digital AXE exchanges in the city of Ningbo.—*Ericsson.*

TACS mobile telephone system for Malaysia

☐ An order worth 31 million Swedish kronor has been awarded by Malaysia to *Ericsson*, in co-operation with *STM Cellular Communications Sdn. Bhd.* (Celcom), for a *TACS* mobile telephone system.

The system will in its first phase cover the Kuala Lumpur and Johore Bahru areas.

A national expansion is expected to reach 40 000 subscribers within four years.

Ericsson inaugurated the first mobile telephone system in Malaysia in January 1985, which was an *NMT* system. This system now has 27 000 subscribers.—*Ericsson.*

Pakistani exchanges will use CCITT No. 7 signalling

☐ The Pakistan Telephone and Telegraph Department signed a contract, valued at 16 million United States dollars with *Ericsson* for the supply of *AXE* digital telephone systems to Rawalpindi and Lahore.

The AXE order covers two new local exchanges and four extensions of existing local exchanges. The exchanges will be equipped with the CCITT No. 7 common channel signalling system, which has been specified in Pakistan for the first time.

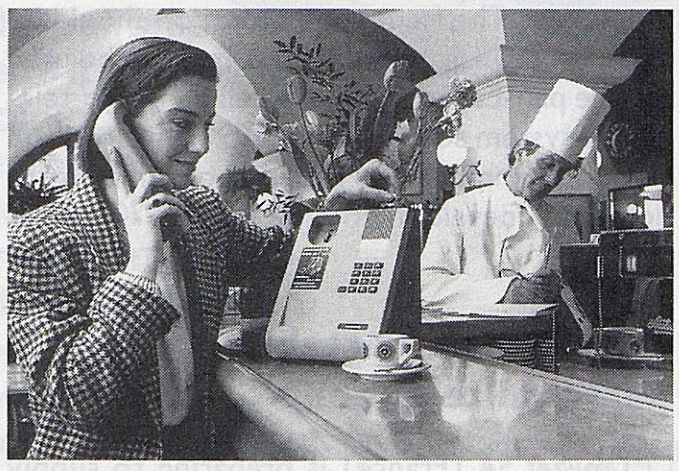
In addition to the AXE equipment, the contract includes Ericsson's new range of telephone sets, *Dialog 2000*, as well as power and cooling equipment. An extensive training programme is also included in the contract. Installation will be completed by January 1990.

Financing will be supplied through a soft-loan by *BITS* (the Swedish agency for international technical and economic co-operation) to Pakistan.—*Ericsson.*

A new coin-operated telephone for Switzerland

☐ The Swiss PTT has placed an order with *Sodeco SA* (Geneva) for 5000 coin-operated telephone sets, with an option for a further 5000. Delivery of the new sets started in May 1989.

The *Phonotaxe BTE25* is a coin-operated set for use in protected premises such as public establishments, hairdressing salons, businesses, etc.



890109

The Phonotaxe BTE25

The equipment has a single slot which takes different coins. It can also be operated with a key instead of coins.

The same type model has been supplied to France, the Netherlands and Turkey.—*Sodeco.*

Compensation for poor service

☐ On 1 April 1989 British Telecom introduced a customer service guarantee.

Under the scheme customers will be able to claim compensation if they are without telephone service for more than two clear working days because of British Telecom's failure to install a line on the agreed date, or to repair a telephone line promptly.

Customers will be entitled to claim 5 pounds sterling (GBP) for every working day that installation or repair of a telephone line is delayed beyond the second clear day.

Alternatively, the company will accept liability for claims for loss after the second clear day of up to 1000 GBP per line for residential customers and 5000 GBP per line for business customers, where actual financial loss can be proved. Businesses with many exchange lines will be limited to claiming financial loss up to 20 000 GBP.

Customers have up to two months to claim compensation, or for losses incurred.—*British Telecom.*

Commercial satellites: a world market forecast

☐ *Satel Conseil* has performed a multi-user study which evaluates the main characteristics of the commercial satellite market until the beginning of the next century.

The study evaluates the number, type, size and timetable of commercial satellites to be ordered over the next 15 years. The study is broken down into four major sections: Europe, the United States, the world outside Europe and the United States, and the international organizations. Neither military nor scientific satellites nor satellites of the USSR have been included.

Operational, pre-operational and technological systems are covered, whether already in orbit, under development or in the planning stage. Likely and possible new entrants in the field are thoroughly evaluated.

An introduction to each section describes the major trends in market evolution, competition with terrestrial systems, regulatory aspects and technological developments.

An overall synthesis and summary tables based on individual system reviews provide a comprehensive look at the total number of satellites to be ordered during the 15-year period covered by this study.

Each system receives its own separate treatment, with data on:

- the system's history and perspectives;
- satellite mass and power;
- frequency bands, polarizations, footprints, orbital positions;
- wherever possible, the number of transponders and output power.

Scenarios of system evolution are presented along with their corresponding probabilities.

The complete study, written in English, costs 2000 United States dollars. Separate sections are available.–*Satel Conseil.*

News from INTELSAT...

... contracts for launch services

☐ The 79th meeting of the International Telecommunications Satellite Organization's Board of Governors has authorized contracts with *Arianespace* and General Dynamics Commercial Launch Services, Inc. for *Intelsat-7* launches. Three spacecraft will be launched on Arianespace and two on General Dynamics launch vehicles.

The assumed launch dates for these five Intelsat-7 spacecraft are:

- launch No. 1 (Ariane): 3rd quarter 1992;
- launch No. 2 (GD): 1st quarter 1993;
- launch No. 3 (GD): 2nd quarter 1993;
- launch No. 4 (Ariane): 4th quarter 1993;
- launch No. 5 (Ariane): 2nd quarter 1994.

... transponder sales agreements

☐ The Board of Governors also approved the sale of ten transponders to seven countries under the INTELSAT Planned Domestic Service (PDS) programme:

- one 72 MHz hemispheric beam transponder on *Intelsat-5A F12* to Niger;
- one 72 MHz zone beam transponder on *Intelsat-5A F12* to Italy;
- six Ku-band spot beam transponders on *Intelsat-5A F15* to the Federal Republic of Germany;
- one 72 MHz hemispheric beam transponder on *Intelsat-5A F12* jointly to Norway, Gabon, Chad and the Central African Republic;
- one 72 MHz hemispheric beam transponder on *Intelsat-5A F12* to Gabon.

... Zimbabwe

☐ Zimbabwe has become the 117th member of INTELSAT. Zimbabwe will have a minimum investment share of 0.05%.–*INTELSAT.*

A fifth "Eutelsat-2" satellite

☐ The European Telecommunications Satellite Organization (EUTELSAT) has placed an order with *Aerospatiale* for a fifth satellite in the *Eutelsat-2* series. The satellite, which is to be delivered in 1992 for a cost of roughly 52.8 million ECU, will provide telephony, television-programme distribution, data transmission and business link services to the 26 EUTELSAT member countries.

Eutelsat-2 has a payload of 16 simultaneously useable repeaters in band Ku, offering a capacity of 17 000 telephone circuits or 16 television programmes or an equivalent traffic for other services.–*Aerospatiale.*

"TVSat-2" to be launched by "Ariane" this month

☐ The Federal Republic of Germany's broadcasting satellite *TVSat-2* is to be launched at the end of June with an *Ariane* launcher.

TVSat-2 is to replace its predecessor *TVSat-1*, launched at the end of 1987, one of whose solar panels failed to open.

The new satellite will broadcast four of the Federal Republic's television channels using the D2 MAC-packet system. An additional channel is reserved for digital radio broadcasting.

The Federal Republic of Germany is currently negociating to obtain a digital radio broadcasting channel on France's virtually identical *TDF-1* satellite which was launched late in October 1988.–*La lettre du CNES.*

Aeronautical digital trial

☐ Ferranti Computer Systems Limited has completed the first trial of a new digital system, *CIDIN* (common ICAO data interchange network), which will replace the existing methods of switching aeronautical information with high-speed packet switching techniques.

The trials will be followed by installation at London's Heathrow Airport of a Ferranti Aeronet AFTN (aeronautical fixed telecommunications network) message switching node which will include CIDIN capability.

Current AFTN working is via relatively slow 50, 75, 110 and 300 bit/s transmission rates, which often requires manual intervention by operators, has no effective automatic error correction and recovery and no graphic transmission capability.

CIDIN, however, will facilitate higher transmission rates of 9600 bit/s on leased lines and up to 64 kbit/s on digital links, automatic error correction and recovery, a minimum of manual intervention, and full graphics transmission capability for meteorological maps. CIDIN is based on CCITT Recommendation X.25.–*Ferranti International.*

Telex digital switching: new contracts

☐ Following international calls for tender, Thailand and Hungary have now chosen the *Société d'applications générales d'électricité et de mécanique* (SAGEM) to equip and develop their telex networks.

Thailand has chosen an *Eltex V Omega* digital automatic exchange for installation at Bangkok in 1989-1990.

After opting for a centralized telex message handling system, Hungary has chosen four Eltex V Omega systems which are to be placed in service in 1990 at Miskolc, Kaposvar, Szolnok and Szombathely.–*SAGEM.*

European fibre-optics market

☐ There is enough fibre-optic cable in Europe to circle the globe twice around, says a new study–some 90 000 km–but that is only the beginning, as the PTTs are already being outspent by businesses establishing state-of-the-art private networks. In fact, says *Fiber optics communications market in Europe* (No. E1012), a two-volume, 377-page report researched and written in Europe by Frost & Sullivan Ltd, sales of components will double between 1988 and 1993. The 1988 total of 443 million United States dollars (USD) in sales of such items as cabled fibre, splicers, test kits, connectors, couplers, modems and more will reach 911 million by 1993, the study predicts. This includes export sales. (In 1988, for instance, the European demand stood at 394 million USD, while exports accounted for 49 million of the sales made.) Since 1984 there has been a significant trend away from the public service networks (PSNs), Frost & Sullivan points out, and this will continue. Whereas in 1984, 63% of the value went to PSNs, by 1988 this was down to 32%, with about half the total value of fibre optic components going to private networks.

To render a complete portrait of the market, the study breaks down and forecasts volume along several lines: uptake is shown by the three main end user groups, seven categories of equipment, and the geographic markets of the United Kingdom, Federal Republic of Germany, France, Italy, Benelux, Scandinavia, Switzerland, and "other". Product, population, and annual unit numbers are discussed along with the value totals. Nationally, by 1993 the United Kingdom will have more than 2 million transmitters/receivers/modems and almost 3 million connectors. France will have over 1 million transmitters/receivers/modems and about as many connectors as the United Kingdom. The Federal Republic of Germany will resemble France in the population of these products, "but the distribution will be very different, with the largest numbers occurring in PSNs".

In value, the United Kingdom is shown to be Europe's dominant market in fibre optics, a 114 million USD market in 1988. The Federal Republic of Germany's 105 million in component sales in 1988 rank it second, and France's 103 million, establish it as the third largest market. The report profiles the leading suppliers. The price of report No. E1012 is 3200 USD.

Frost & Sullivan Ltd, 4 Grosvenor Gardens, London SW1W 0DH (United Kingdom). Tel.: (01) 730-3438. Telex: 261671. Telefax: (01) 730-3343

Financial services boost to European telecoms

☐ Booming European financial services can thank telecommunications for much of their success, according to a report entitled *European business communications: financial services 1989* from London-based communications analysts CIT Research. The report also shows just how important banks, insurance firms and other financial users are to the telecommunication industry. The sector is the most intense user of business communications in the whole West European economy—annual spending on services per employee is 1500 ECU, four or five times the average for *all* business.

According to CIT, financial and business services (including banking, insurance, stock markets plus various other professional and business services) account for only 6% of West European employment, but contribute over 600 billion ECU of West European GDP (15% of business activity as a whole). So it is a high productivity sector. Yet CIT says it represents an impressive 30% of all spending on business communications. The correlation between high productivity and the use of communications is clear.

CIT's findings show that the financial and business services sector spent a total of 2 billion ECU on non-PSTN basic network services (telex, leased lines, packet switching, etc.) in 1988. Most of this was on private circuits (54%) which have become essential to core businesses. The sector spent an estimated 405 million ECU on the more competitive alternate network services (mainly high-profile mobile communications, plus satellite, cable and videotex). Some 1.2 billion ECU was spent on value-added services, mainly data bases.

CIT found no other field where telecommunication services were quite so central to core activities. The very business of finance depends on the fast and efficient transfer of a wide range of information. In some cases, profit is directly related to the speed of transaction. In others, competition is so fierce that efficiency, or quality of service, determines whether customers are won or lost. As new, more efficient communications methods have become vital for daily needs, companies in the sector are usually good, if rather discerning, customers for telecommunications.

The financial sector's demand for new services will continue to grow fast. The positioning of companies for regulatory changes in 1992 provides extra stimulus to an already highly competitive sector. Telecommunications can only benefit from this level of activity, according to CIT.

However, the researchers offer a final word of warning. The concentration on the financial sector is disproportionate. Other sectors—for instance retailing, manufacturing, transport, utilities and government services—may offer excellent potential in the longer term.

For further information contact: *Susan Cadwallader, Director of Services, CIT Research Ltd, 23 Dering Street, Hanover Square, London W1R 9AA (United Kingdom). Tel.: +44 1 493 9247. Telefax: +44 1 629 9256.*

In brief...

☐ **Indonesia is extending** its existing **NMT-system** and has placed an order with *Ericsson* valued at 24 million Swedish kronor. The first system was delivered in 1986 and has 6500 subscribers.—*Ericsson.*

☐ During a visit of a **Chinese** government delegation to *Standard Elektrik Lorenz AG* (SEL), an order was given to the Stuttgart company for the delivery and installation of a **radio-relay transmission link**. The volume of the order, the realisation of which will begin this year, amounts to 13 million deutsche Marks.—*SEL.*

☐ *Kokusai Denshin Denwa Co., Ltd.* (KDD) has concluded an agreement with the American Telephone and Telegraph Company (AT&T) to the effect that all **technical patents** held by the two companies and their subsidiaries may be used mutually until 1 January 1994.—*KDD.*

☐ The seventh overseas **receiving station for MOS-1, a Japanese marine observation satellite** has been opened **in Thailand**. Other overseas receiving stations already in operation are located in Spain, Sweden, Italy, Norway, Australia and Canada.—*National Space Development Agency of Japan.*

☐ In January 1989, more than 1.6 million subscribers were calling in an *AXE*-based cellular mobile telephone system in service. The total number of subscribers in the world were at that time 3.9 million. *Ericsson's* market share of the total world market is 41%.—*Ericsson.*

☐ **Payphones are to be manufactured in India** under a joint venture agreement signed between GEC Plessey Telecommunications (GPT) and the *Usha RKKR* group, one of India's largest industrial corporations.

The joint venture, which will give GPT a 40% holding, includes technology transfer and will initially concentrate on the manufacture of payphones accepting pre-pay stored value cards, already prevalent in Europe.—*Stromberg-Carlson.*

☐ *Nippon Telegraph and Telephone Corporation* (NTT) has announced that its **procurement from foreign suppliers** during fiscal 1988 (from 1 April 1988 to 31 March 1989) totalled approximately **366 million United States dollars (USD)** (46.8 billion yen), a 91 million USD or about 33% increase over the previous year.

The area from which NTT has purchased the most remains the United States at 90% of total foreign procurement.—*NTT.*

☐ *Nippon Telegraph and Telephone Corporation* (NTT) has selected the bid of a United States battery maker, GNB Incorporated, as one of its suppliers of medium-capacity sealed lead-acid batteries (200 to 3000 Ah) for fiscal 1989 beginning 1 April.

The contract is for approximately 10 000 units, NTT's **largest-ever foreign battery purchase.**

The sealed battery has come to replace the conventional lead-acid battery as a communications power source because it is safer, producing no hydrogen gas, and easier to maintain, not requiring the periodic checking or replacement of water associated with the conventional type.–*NTT.*

Personnel changes...

... in Jamaica

☐ Mr Robert Pickersgill has been appointed Minister of Public Utilities and Transport.

... in the Lao P.D.R.

☐ Mr Bouathong has been appointed Minister of Communications, Transport, Posts and Construction.

... in Paraguay

☐ Mr Porfirio Pereira Ruiz Díaz has been appointed Minister of Public Service and Communications.

Messrs Miguel Cirilo Guanes, Miguel Horacio Gini, Emilio P. Villasanti and Alberto Modesto have been appointed, respectively, Director General and Chairman, Secretary-General, Director of International Affairs and Director of Broadcasting and Frequency Administration of the *Administración Nacional de Telecomunicaciones* (ANTELCO).

... in Venezuela

☐ Mr Gustavo Rada has been appointed Minister of Transport and Communications.

Technical News

Portable two-way satcoms system

☐ The portable commercial satellite communications system of the International Maritime Satellite Organization (INMARSAT), using low cost earth stations small enough to be fitted to any vehicle or even to be hand carried, started operation on 1 March 1989.

The first transmission was a test telex call sent from a mobile terminal, via INMARSAT's Atlantic Ocean region satellite. Within a year, the new system, using standard-C technology developed by INMARSAT at a cost of more than 10 million United States dollars, is expected to be handling tens of thousands of messages on a daily basis world-wide.

Initially, standard-C pre-operational service is being made available free of charge except for the landline connections. INMARSAT has taken this step to give equipment manufacturers and potential users the opportunity to get their systems up and running at minimal cost. At the same time, the pre-operational period will also give INMARSAT and coast earth station operators valuable hands-on experience with the new system.

INMARSAT expects to begin a similar pre-operational service in the Pacific Ocean area about mid-1989. Full commercial service is expected to be available in the Indian Ocean area soon after, and globally in early 1990.

The standard-C system offers data and messaging services using terminals that weigh only a few kilos. Some of the first users are expected to be trucking fleets, maritime operators, and news reporters in the field. The system offers two-way messaging, fleet management, automatic position reporting, and emergency alerting capabilities. Land-based applications include remote monitoring and control.

The European Conference of Postal and Telecommunications Administrations (CEPT) has decided to study the incorporation of INMARSAT's standard-C satellite communications system with the pan-European digital cellular telephone network. This would enable communications to continue uninterrupted throughout Europe using satellite communications, even when vehicles are out of range of a cellular telephone system.

The maritime community will also benefit from standard-C communications for the dissemination of maritime safety information, including navigational and meteorological warnings, in addition to a range of data and messaging applications.

In November 1988, the International Maritime Organization (IMO) adopted satellite communications including standard-C as a means of satisfying its maritime safety communications requirements.–*INMARSAT.*

Spanish satellite network

☐ The Spanish Administration intends to launch and operate a satellite network called Hispasat-1, located on the geostationary-satellite orbit at 31° W. *Hispasat-1* will carry the following payloads:

- payload for the broadcasting-satellite service (18/12 GHz bands);
- payload for the fixed-satellite service for distributing television, telephony and data signals to Spanish territory and distributing television signals to part of America (11-12/13-14 GHz bands);
- payload for the fixed- and mobile-satellite services for governmental use (7/8 GHz bands).

Telecommand tracking and telemetry will be carried on the 2 and 14 GHz bands.

It is planned to bring the Hispasat network into use on 1 December 1991. A standby satellite, *Hispasat-2*, will also be built.–*IFRB Weekly Circular.*

Microwave sounding for weather satellites

☐ British Aerospace (Space Systems) Limited has been awarded a contract worth 9.5 million pounds sterling from the United Kingdom Meteorological Office to design, develop and manufacture a spacecraft instrument for producing global atmospheric humidity measurements from weather satellites in the 1990s.

The instrument, known as *AMSU-B* (advanced microwave sounding Unit-B) will fly on the polar orbiting *Tiros-Next* series of spacecraft due for first launch in 1993, for operation by the United States' National Oceanic and Atmospheric Administration (NOAA).

AMSU-B will detect atmospheric radiation in different regions of the microwave spectrum and format the data by an on-board microprocessor system.

Data relayed from the satellite are processed on the ground to provide users with vertical profiles of the water content of the atmosphere over the whole globe. Such global data will lead to the production of more accurate weather forecasts.

It is expected that further versions will be built to fly on European satellites later in the 1990s.–*British Aerospace.*

SATELLITE LAUNCHINGS NOTIFIED DURING PERIOD 19 JANUARY TO 22 FEBRUARY 1989

Code name Spacecraft description	International number	Country Organization Site of launching	Date	Initial orbital data Perigee (km) Apogee (km)	 Period (min) Inclination (degree)	Frequencies Transmitter power	Observations
Gorizont-17 3-axis stabilized; solar panels	1989-4-A	USSR (Baikonur)	26 Jan.	36 506 in geostationary-satellite orbit	1473 1.3	5.7-6.2 GHz (reception) 3.4-3.9 GHz (emission)	Television and multichannel radio-communications
Cosmos-1992	1989-5-A	USSR	26 Jan.	777 814	100.7 74		
Intelsat-5A F15 3-axis stabilized; height: 6.6 m; 2 solar arrays	1989-6-A	International INTELSAT (Kourou)	27 Jan.	35 355 35 709 in geostationary-satellite orbit at 60° E	1423.1 0.3	6/4 and 14/11 GHz bands (communica-tions)	Commercial telecommunications. Replaces *Intelsat-5A F12* which has been moved to the Atlantic region
Cosmos-1993	1989-7-A	USSR	28 Jan.	180 382	89.9 64.8		
Progress-40 modified *Soyuz* spacecraft without the descent section; 7 tonnes at launch; diameter: 2.3 m; length: 7.9 m	1989-8-A	USSR (Baikonur)	10 Feb.	193 262	88.8 51.6		Expendable supply craft. Docked with the *Mir-1* space complex on 12 February 1989. Corrected *MIR-1*'s flight trajectory. Undocked and disintegrated on re-entry on 5 March 1989
Cosmos-1994 to **Cosmos-1999**	1989-9-A to 1989-9-F	USSR (Plesetsk)	10 Feb.	1403 1442	114.1 82.6		
Cosmos-2000	1989-10-A	USSR	10 Feb.	191 275	88.8 82.3		Earth resources exploration. Recovered on 3 March 1989
Cosmos-2001	1989-11-A	USSR (Plesetsk)	14 Feb.	613 39 342	709 62.8		
Cosmos-2002	1989-12-A	USSR	14 Feb.	187 2315	110.4 65.8		
USA-35	1989-13-A	United States	14 Feb.	20 010 20 455	720.0 55.1		

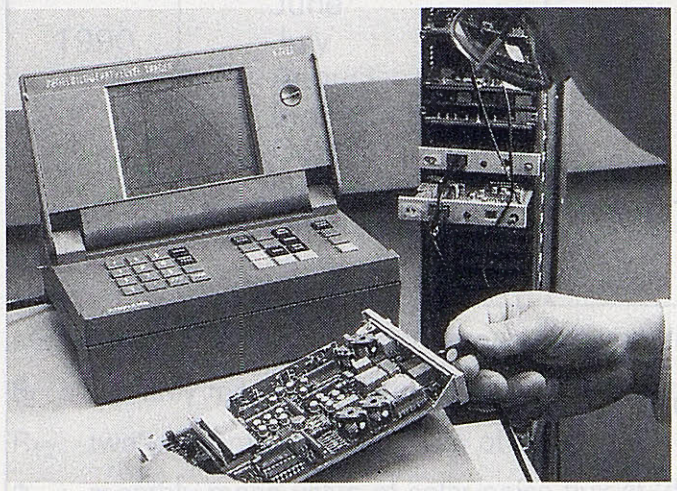
Code name Spacecraft description	International number	Country Organization Site of launching	Date	Initial orbital data		Frequencies Transmitter power	Observations
				Perigee (km) Apogee (km)	Period (min) Inclination (degree)		
Molnya-1 (75) hermetically sealed cylinder with conical ends; 1000 kg; 6 solar panels	1989-14-A	USSR (Plesetsk)	15 Feb.	486 38 937	698 62.5	800 MHz band 40 W (emission) 1000 MHz band (reception) 3400-4100 MHz (retransmission of television)	Television and multichannel radio-communications
Cosmos-2003	1989-15-A	USSR	17 Feb.	249 271	89.5 62.8		Recovered on 3 March 1989
EXOS-D (Akebono)	1989-16-A	Japan Institute of Space and Aeronautical Science (Kagoshima)	21 Feb.	276 10 474	211.3 75.1	2280.5 MHz 400.45 MHz	Study of formation of auroras in the upper atmosphere
Cosmos-2004	1989-17-A	USSR	22 Feb.	993 1031	105.1 83		

Sources: COSPAR, NASA, specialized press.

New Products

Level measurements from 30 Hz to 200 kHz

☐ The *K2223* level tracer from *Siemens* is a portable and compact instrument for measurements in the low-frequency range and level measurements in the radio range. The instrument can also be used for measuring data or carrier-frequency transmission links in the frequency range from 30 Hz to 200 kHz.



890110

K2223 level tracer

The level tracer is menu-driven in interactive mode. Measuring parameters are clearly adjustable through the menu. Results are plotted graphically in the form of curves over the frequency. Sweeping is possible in the frequency ranges from 200 Hz to 4 kHz and from 30 Hz to 20 kHz.

Impedance and return loss measurements can be made in the sweep mode. For noise level measurements, the unit is equipped with an A filter and a filter for sound transmission to CCITT/CCIR. The level tracer also features tolerance masks.

The instrument is battery-operated and is thus also suitable for mobile service work. For documentation of the measured values, a printer can be connected via a V.24 interface.

Siemens Infoservice, Postfach 2348, D-8510 Fürth 2 (Fed. Rep. of Germany). Tel.: (0911) 3001-274

Third generation connectors for RF systems

☐ Prompted by the higher transmission rates of digital long-range communications systems (compared to the conventional analogue systems), *Siemens* has developed a series of improved coaxial connectors. These third generation connectors are a modular system, hence the designation 1.6/5.6 mS. They meet all the requirements of modern PCM and are therefore suitable for systems with high bit rates in the frequency range up to 8 GHz. The connectors of this new series are available as straight and angled types and with screw-type (Form A), snap-in (Form B), slide-in (Form C) and housing (Form D) coupling mechanisms.

Siemens AG, Components Division, Postfach 70 00 72, D-8000 München 70 (Fed. Rep. of Germany)

Snap-in capacitors

☐ *Siemens* has introduced aluminium electrolytic capacitors whose two spring contacts, which are bent at the tips, are intended for snap-in mounting on circuit boards. The capacitors are finally secured in the solder bath.

The rated capacitances range from 68 to 47 000µmF (up to 85°C) and from 47 to 33 000 µmF (up to 105°C); voltage ratings are from 10 to 400 V.

890097

Snap-in capacitors

A primary application will be switched-mode power supplies and other power supply units.

Siemens AG, Postfach 103, D-8000 München 1 (Fed. Rep. of Germany). Tel.: (0 89) 23 40. Telex: 52 100-25. Telefax: 2 34 28 24

RURTEL – A telecommunications system for thinly populated areas

☐ The telecommunications system *RURTEL DRRS 250/1500* or *DRRS 250/2400* (digital rural radio system), operating at 1500 or 2400 MHz, is designed to serve 320 subscribers or more in isolated areas with the same services as are enjoyed in large cities, and at similar cost.

Existing networks of cable, radio transmission and exchanges can be extended with RURTEL which integrates remotely situated communities into the network. Digital data transmission systems bridge great distances without signal distortion or other disturbance.

The digital microprocessor-controlled central station is modular in design to cover a wide range of applications. It has extension capabilities to serve growing demand and supplementary services such as telex, data transmission up to 64 kbit/s and special telephone services.

The RURTEL system comprises three basic system components:

- the CSt (central station) installed with the required transmitter/receiver equipment for connection with the subscribers and interface units for connection to the main network via existing local exchanges;
- the SSt (subscriber station) serving up to maximum 24 telephone subscribers and 4 telex subscribers within a 10 km range. The SSts may be located around the CSt within a radius of 25 km. An SSt can be easily powered at low cost by solar energy;
- the RSt (repeater station) which provides for services to subscribers located beyond the 25 km radius of the CSt. Up to 12 repeater stations can be located in a chain bridging a total distance of maximum 500 km between the central station and the most remote subscriber.

Standard Elekrik Lorenz AG, Lorenzstrasse 10, D-7000 Stuttgart 40 (Fed. Rep. of Germany). Tel.: 8 21-23 27. Telex: 7 2 526 319. Telefax: 8 21-34 52

1.0/2.3 coaxial connectors: now also for 75 Ω

☐ To satisfy the rapidly growing need for small 75 Ω coaxial connectors for the gigahertz range, *Siemens* has now redesigned the series 1.0/2.3 family of connectors and improved them so that they can now be used for frequencies of up to at least 2 GHz. The new version is plug and pin compatible with the previous 50 Ω series 1.0/2.3 connectors, also with respect to mounting.

Compared to the previous 50 Ω versions, there is no need for modifications to the connection system.

Depending on the type, the reflection coefficient is 0.03 to 0.08 at 2 GHz.

Siemens AG, Postfach 103, D-8000 München 1 (Fed. Rep. of Germany). Tel.: (0 89) 23 40. Telex: 52 100-25. Telefax: 2 34 28 24

Dates to remember

- *ITU-COM 89 (Geneva, 3-8 October 1989)*
  World Electronic Media Symposium and Exhibition organized by the ITU
- *TELECOM 91 (Geneva, 8-15 October 1991)*
  6th World Telecommunication Exhibition and Forum organized by the ITU

Note from the CCIR

Basic indices for ionospheric propagation

The following values of basic indices are published by the Specialized Secretariat of the CCIR in accordance with Resolution 4-3 and Recommendation 371-5 of the XVIth Plenary Assembly of the CCIR (Dubrovnik, 1986). The values are based on data kindly supplied by Dr. A. Koeckelenbergh, Sunspot Index Data Centre (Brussels), the National Research Council (Ottawa) and the Rutherford Appleton Laboratory (Chilton, Didcot, United Kingdom).

In order to expedite the dissemination of the indices, the CCIR Secretariat prepares a monthly circular which is dispatched around the middle of each month. Copies of these circulars may be obtained free of charge, from the Director of CCIR, ITU, Place des Nations, CH-1211 Genève 20 (Switzerland).

year	month	R_I	R_{12}	Φ	Φ_{12}	IG	IG_{12}	month	year
	January	59.6	58	108.1	111	43	48	January	
	February	40.2	65	105.0	116	44	55	February	
	March	75.8	71	115.0	122	62	62	March	
	April	88.0	77	122.7	128	73	70	April	
	May	59.7	84	115.2	132	69	78	May	
	June	101.8	94	139.6	141	86	86	June	
1988	July	112.6	104	151.5	152	93	94	July	1988
	August	111.2	114	155.4	161	105	103	August	
	September	120.8	121	152.5	169	117	111	September	
	October	124.4	125	169.8	174	131	***118***	October	
	November	125.6	***130***	156.2	***180***	124	***125***	November	
	December	179.4	***138***	199.8	***190***	129	***132***	December	
	January	161.6	***145***	235.4	***197***	145	***137***	January	
	February	164.5	***151***	222.4	***201***	148	***142***	February	
	March	131.0	***157***	205.1	***206***	155	***145***	March	
	April	129.3	***164***	189.6	***211***		***149***	April	
	May		***169***		***215***		***153***	May	
	June		***175***		***223***		***156***	June	
1989	July		***181***		***229***		***159***	July	1989
	August		***183***		***231***		***161***	August	
	September		***183***		***235***		***163***	September	
	October		***182***		***239***		***164***	October	
	November		***180***		***238***		***165***	November	
	December		***178***		***238***		***166***	December	
	January		***176***		***238***		***167***	January	
	February		***174***		***238***		***168***	February	
	March		***172***		***240***		***169***	March	
	April		***170***		***241***			April	
	May							May	
	June							June	
1990	July							July	1990
	August							August	
	September							September	
	October							October	
	November							November	
	December							December	

Measured values are printed in roman type: predicted values in bold italic type.

R_I : monthly mean international relative sunspot number

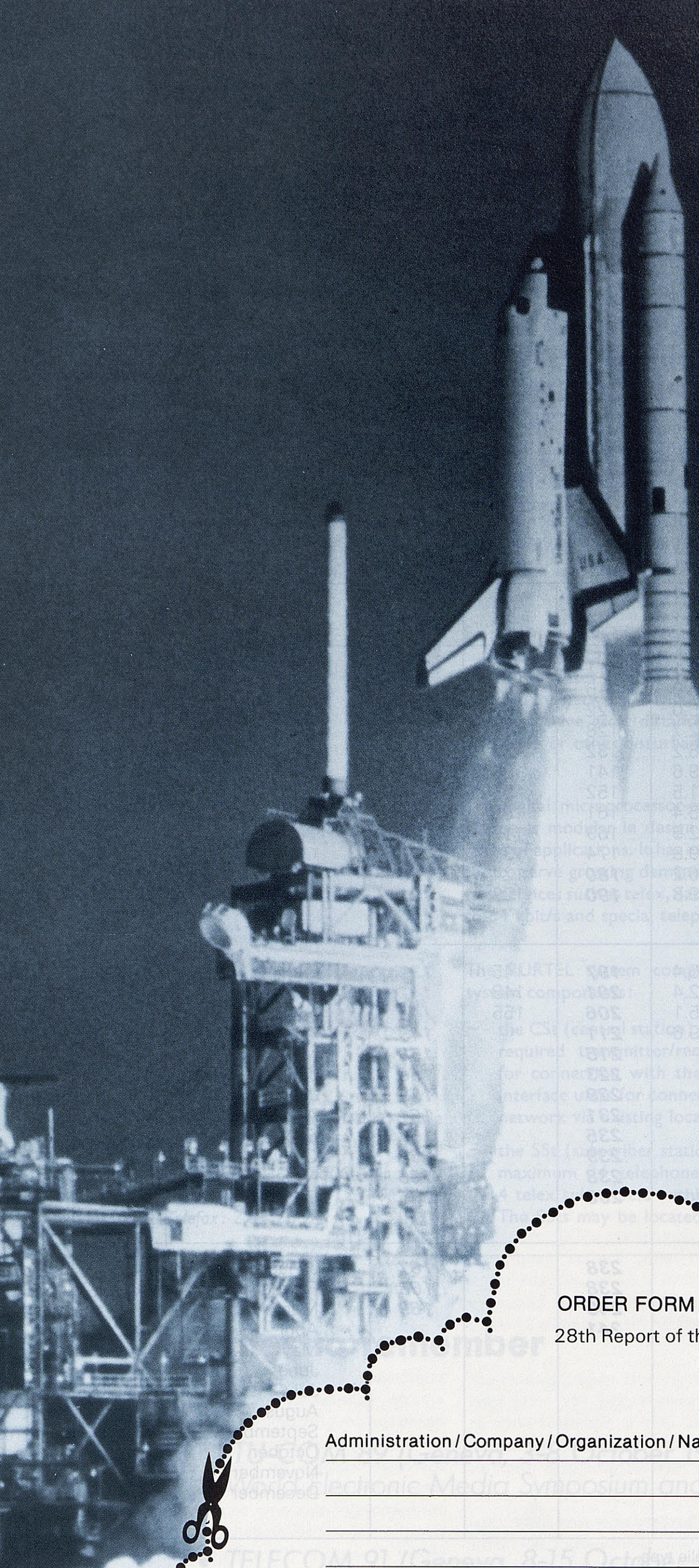
R_{12}: twelve month running mean of R_I

Φ : monthly mean value of solar noise flux at 2800 MHz at 17h00 UTC measured at Ottawa

Φ_{12} : twelve month running mean of Φ

IG : ionospherically derived solar activity index

IG_{12}: twelve month running mean of IG



Twenty-eighth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space

The ITU published in May 1989 the Twenty-eighth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space.
The booklet of some 100 pages is sold at 10 Swiss francs per copy.
It describes the action taken with regard to outer space by the International Telecommunication Union since the submission of the Twenty-seventh Report in 1988.

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Books

ADVANCED MICROWAVE ENGINEERING: SPECIAL ADVANCED TOPICS

by R. Chatterjee.

This book reviews advanced specialized topics in microwave engineering and is designed for researchers and workers in electronics, electrical communications and electrical engineering. The author's determination to narrow the gap between teaching of the subject and modern advanced research, is shown in her clear exposition from the basic (but well established) scientific principles through systematic and logical analysis of the topic, forming a rigorous treatment that is readable and comprehensible to researchers and workers alike.

Specialist topics covered include surface waveguides, waveguide elements and components, scattering and impedance matrix representation of microwave junctions, microwave filters and non-reciprocal microwave devices. A distinguishing feature is the extensive treatment of microwave antennas, communications, measurements and solid state devices. Problems at the end of each chapter and numerous diagrams enhance the text.

One bound volume; pp. xiv + 535; illustrations, diagrams. 16× 24 cm. Published by Ellis Horwood Limited, *Market Cross House, Cooper Street, Chichester, West Sussex PO19 1EB (United Kingdom), 1988. Price: 39.95 pounds sterling.*

INTERNATIONAL JOURNAL OF SATELLITE COMMMUNICATIONS

Volume 6, Number 2 (Special issue on intersatellite links)

edited by R. A. Peters.

This special issue is devoted to intersatellite links (ISLs). The size and scope of this publication attest to the widespread interest in this topic, which has been attracting increased attention over the last few years because of new applications and developments in optical technology.

The first two papers, "Principles and design of bidirectional optical ISL..." and "Solid-state laser cross-link systems and technology" present broad overviews of some of the trade-offs involved in designing an optical ISL, with the second paper being more hardware-oriented. The paper "Identification of requirements for intersatellite links" examines some of the possible applications of ISLs. The remaining papers deal with more specific topics.

Published by Wiley-Interscience, John Wiley & Sons Limited, *Baffins Lane, Chichester, West Sussex, PO19 1UD (United Kingdom), 1988.*

ISDN IN THE INFORMATION MARKETPLACE

by R. K. Heldman.

This book takes integrated services digital networks from ideology to conceptual reality. It contains a complete listing of ISDN features and services available world-wide through computer communications on four levels: voice, data, video and images.

Many telecommunication services are already utilized everyday on a local and national basis: telephone, teleshopping, television, telefax, videoconferencing, data processing. The revolution lies in the fact that these services and more will soon become available on an international basis via a global network system. The possibilities made real by this sophisticated technology will have far-reaching effects on world business, science and education industries.

One bound volume; pp. xv + 333; illustrations, diagrams. 16× 24 cm. Published by TAB Books Inc., *Blue Ridge Summit, PA 17294-0214, 1988. Price: 27.75 pounds sterling.*

СПУТНИКОВАЯ СВЯЗЬ И ПРОБЛЕМА ГЕОСТАЦИОНАРНОЙ ОРБИТЫ

(Satellite communication and the problem of the geostationary orbit), by L. J. Kantor and V. V. Timofeev.

The problems of the efficient utilization of the geostationary-satellite orbit by the communications and broadcasting systems are considered in this book. It contains the description of the characteristics of the geostationary-satellite orbit and communication systems using the geostationary satellites. The calculation of the mutual interferences between such systems is also given. In the book, great attention is paid to analysing the methods of increasing efficiency in the use of the geostationary-satellite orbit. The principles of the international regulations including the allotment planning of the satellite's position and the frequency bands are described.

The book is for engineers-designers of satellite communication or broadcasting systems. It is also suitable for students and postgraduates.

A. Nalbandian

One paperback volume; pp. 168; illustrations, tables. 14.5× 21.5 cm. Published by Radio i Sviaz, *Moskva (USSR), 1988.*

A BIBLIOGRAPHY OF TELECOMMUNICATIONS AND SOCIO-ECONOMIC DEVELOPMENT

by H. E. Hudson.

This book is designed for people who need to find information on the relationship of telecommunications to economic and social development. This field has attracted growing interest in the 1980s, as innovations in technology, a proliferation of new services, and changes in the telecommunications industry have coincided with a greater awareness of the contribution of telecommunication and information technologies to development in the broadest sense, including economic growth and improved access to education and social services. While heightened visibility has greatly enriched the field, it has also made the search for relevant material both more complex and more rewarding. There are certainly many more studies now than there were five years ago, but they are still scattered in academic journals, professional publications, trade press, and conference proceedings of numerous disciplines. Researchers may not uncover the most relevant studies simply by reviewing the literature in their field. However, even consulting a data base may not be sufficient. References may be scattered throughout so many fields that it is necessary to search numerous data bases that cover social sciences, engineering, education, and international development to find relevant material. This bibliography compiles citations from numerous data bases and other sources to assist researchers and planners concerned with the role of telecommunications in socio-economic development.

Contents include: overview; recent developments; a variety of perspectives; integrating telecommunications planning with development planning; a research agenda; bridging the gap between policy and research; bibliography of telecommunications and socio-economic development, etc.

One paperback volume; pp. xviii + 241; Published by Artech House, Inc., *685 Canton Street, Norwood, MA 02062 (United States), 1988.*

PROTECTING YOUR PROPRIETARY RIGHTS IN THE COMPUTER AND HIGH TECHNOLOGY INDUSTRIES

by T. B. Marzouk.

The computer and high technology industries have undergone revolutionary changes in recent years. These changes, in turn, have resulted in significant developments in the rapidly growing field of computer law. Among the most important questions facing computer and high technology firms is how they can best protect their proprietary rights in software and hardware without unduly hampering their business development and competitive abilities.

This monograph is an attempt to acquaint the reader with the fundamental elements of proprietary rights protection in the computer and high technology industries and begins with a discussion of three basic methods of asserting proprietary rights in software and hardware: trade secret, copyright, and patent. The scope and application of each method are summarized and applied to computer firms. Second, a discussion is given of how high technology employment contracts can be used to maintain computer trade secrets and confidential information, as well as employee allegiance and support. Specifically, the reader is provided with suggestions in negotiating, drafting, executing, and enforcing employment contracts.

Contents include: trade secret protection for software and hardware; copyright protection for software; patent protection for software and hardware; protecting proprietary rights through employment contracts; marketing protection for computer software and hardware; import protection for software and hardware; export protection of software ownership rights: copyrights, etc.

One bound volume; pp. x + 208; illustrations, diagrams. 16 × 24 cm. Published by IEEE Computer Society Press, *1730 Massachusetts Avenue, NW, Washington, DC 20036-1903 (United States), 1988.*

NEW SYSTEMS AND SERVICES IN TELECOMMUNICATIONS, III NETWORKS, CABLES, SATELLITES–THE WHAT, THE HOW, THE WHY?

Proceedings of the Third International Conference on New Systems and Services in Telecommunications, Liège, Belgium, November 12-14, 1986

edited by G. Cantraine and J. Destine.

In the spirit of the previous meetings, this Conference aimed at setting up a current review of the trends in the telecommunication field. A strong accent has been put on the what, the how and the why of future networks, cables and satellites. Maintaining a good balance between switched and broadcast systems was another main rule for selecting papers and giving a structure to the various sessions. The main topics of the Conference were: multiservice digital networks with narrow and wide bandwidth, terrestrial and satellite networks; local area networks and digital PABX with integrated services; future videocommunication networks and services on coaxial or fibre-optic cable; direct broadcasting and television distribution

using high and low-power satellites; new standards and new services for broadcasting (picture, sound, data), via satellite, cable or terrestrial transmitters; digital systems and new applications for television networks.

This volume contains some 50 papers presented to the Conference and should prove extremely useful for those engaged in telecommunication research and development as well as for beginners who could be anxious to gain concrete information in this area.

One bound volume; pp. xi + 427; illustrations, diagrams. 21 × 28 cm. Published by North-Holland, Elsevier Science Publishers BV, *PO Box 191, NL-1000 BZ Amsterdam (Netherlands), 1987.*

TELECOMMUNICATIONS AND THE LAW: AN ANTHOLOGY

Volume 1

edited by W. Sapronov.

During the last decade, the telecommunications industry has undergone rapid growth and today represents a convergence of computer and communications technologies. And just as the technologies themselves have become interrelated, so too have the legal and regulatory issues associated with them. This timely, important anthology gives readers a better understanding of these complex and evolving issues. It consists of the most well-known and often cited works on telecommunication laws and regulations, written by the industry's leading attorneys, regulators, and policy makers—many of whom have personally affected the developments they discuss.

This volume is written for computer/communications equipment manufacturers and carriers, information service providers, attorneys, economists, policy makers, regulators, consultants, large communications users, and others involved in this rapidly expanding field.

One bound volume; pp. x + 443; tables, diagrams. 16 × 24 cm. Published by Computer Science Press, W. H. Freeman and Company Limited, *20 Beaumont Street, Oxford OX1 2NQ (United Kingdom), 1988. Price: 39.95 pounds sterling.*

ADVANCES IN COMPUTER SYSTEM SECURITY,

Volume III

edited by R. Turn.

In view of the continuing, rapid developments in the fields of computer, data and communications security, the rationale for publishing the earlier two volumes of this book continues to hold for this volume which provides a compendium of reprints of recent, significant papers on new developments in computer security.

This volume is organized in the same fashion as the previous two volumes. Part I (Computer security environment) examines new developments in the threats (especially the computer virus), risk analysis and development of protective techniques. Part II (Approaches to security technology) addresses models of computer security (especially in the multilevel security sense) and approaches to developing trusted and secure systems. Part III (Trusted operating systems and architectures) focuses on development of provably correct operating systems that implement the system's "trusted computing base", on techniques for correctness/secureness verification and validation and on architectural support to these and other security mechanisms. Part IV (Database security) is concerned with architectural as well as cryptographic approaches to achieving security in database systems. Part V (Data communications security) covers the recent advances in secure communications protocols and associated architectures and in the use of cryptographic techniques. The final part (References) is a bibliography of articles cited in this and other introductory sections.

One paperback volume; pp. xiii + 376; illustrations, diagrams. 21 × 28 cm. Published by Artech House, Inc., *685 Canton Street, Norwood, MA 02062 (United States), 1988.*

SPREAD SPECTRUM SIGNAL DESIGN: LPE & AJ SYSTEMS

by D. L. Nicholson.

This book provides a systematic treatment of how spread spectrum modulation may be used to prevent or hamper unwanted signal detection, interception, and exploitation. Engineers working in communications, engineering applications of probability theory, and secure systems will find this volume valuable, comprehensive, and up-to-date.

Contents include: introduction to low probability of exploitation and anti-jam spread spectrum communications; review of spread spectrum modulation techniques; design of spread spectrum signals against linear intercept receivers; design of spread spectrum signals against non-linear intercept receivers, etc.

One bound volume; pp. xii + 291; illustrations, diagrams. 16 × 24 cm. Published by Computer Science Press, W. H. Freeman and Company Limited, *20 Beaumont Street, Oxford OX1 2NQ (United Kingdom), 1988. Price: 35.95 pounds sterling.*

Review of Reviews

A list of articles in other technical publications which may be of interest to readers of the Journal. The articles are listed under the language of the publication.

FRENCH

Actualités de Rohde & Schwarz. Rohde & Schwarz GmbH & Co., KG, Mühldorfstrasse 15, Postfach 80 14 69, D-8000 München 80. Année 1989. **N° 122.** P. 19-23. *Kleucker E.-H.* Nouvelle génération de radiogoniomètres de contrôle de trafic PA 100/PA 200 – P. 26-28. *Dosch F.* Surveillance de l'intensité de champ à l'aide du système TS 9960 – P. 30-31. *Maucksch T.* Testeur de radiocommunication CMT : un appareil unique pour le test de tous les réseaux cellulaires.

Air & Cosmos. 6, rue Anatole-de-la-Forge, F-75017 Paris. Année 1989. **N° 1228.** P. 45. Premiers gros plans de la planète Mars pris par la sonde soviétique Phobos 2 – P. 45. *Langereux P.* Lancement réussi de la 3e fusée Ariane 4 avec les satellites JCSat 1 et MOP 1 – P. 47-48. Plate-forme polaire Matra pour l'Europe.

Bureaux d'études automatismes. 33, rue La Boétie, F-75008 Paris. Année 1989. **N° 50.** P. 38-40. *Kwasny N.* Capteur interférométrique optique intégré – P. 54-58. *Dupuis B. F.* L'émulateur : fédérateur des équipes «hard» et «soft».

Bureaux et systèmes. Fachpresse Goldach, Hudson & Cie, CH-9403 Goldach. Année 1989. **N° 3.** P. 17-19. L'univers frappe à sa porte – P. 22-25. *Brunner B.* Pleins feux sur les couleurs – P. 28-29. *Badel P.-H.* Les téléphones se branchent.

Electronique. AT Zeitschriftenverlag électronique, Bahnhofstrasse 39-43, CH-5001 Aarau. Année 1989. **N° 3.** P. 37-38. Naissance d'une famille de réseaux logiques programmables – P. 41-43. *Herren U.* Fibres optiques dans les réseaux informatiques.

Electronique pratique. 2 à 12, rue de Bellevue, F-75940 Paris Cedex 19. Année 1989. **N° 124.** P. 47-52. *Isabel G.* Générateurs de fonctions – P. 71-81. *Knoerr R.* Un badge optique – P. 95-97. *Martin G.* Commutateur d'alimentation – P. 109-110. Connaître et comprendre les circuits intégrés.

ETi Electronique. Techniques et industries, ESI publications, 5, rue Laromiguière, F-75005 Paris. Année 1989. **N° 67.** P. 49-51. Les tests des cartes à microprocesseur : comment les réaliser avec des systèmes de table – P. 52-55. IN.emulator : l'outil de développement logique – P. 56-60. *Decoux F.* La mise au point d'applications de contrôle-commande en «C».

HIFI Vidéo. 2 à 12, rue de Bellevue, F-75940 Paris Cedex 19. Année 1989. **N° 157.** P. 32-33. *Angus R.* La télévision du futur – P. 44-64. *Prugnard G.* Le plus parfait des lecteurs CD.

Megahertz. Editions SORACOM, La Haie de Pan, F-35170 Bruz. Année 1989. **N° 73.** P. 40-46. *Pierrat J.* Le vol 28 d'Ariane ou d'Arianespace à Intelsat – P. 56-59. *Roncevaux P.* Etude graphique d'une antenne – P. 60-61. *Villemagne P.* Filtres de bande : une émission propre.

Mesures. 33, rue La Boétie, F-75008 Paris. Année 1989. **N° 604.** P. 43-44. Les analyseurs logiques : l'analyse temporelle – P. 49-61. *Renard P.* Oscilloscopes numériques : choisir en connaissance de cause.

Radio plans électronique. 2 à 12, rue de Bellevue, F-75019 Paris. Année 1989. **N° 496.** P. 27-41. *Alary J.* Noise-gate stéréo et compresseur stéréo, format Europe – P. 43-53. *De Dieuleveult F.* Carte décodeur D2 MAC – P. 67-70. *Gueulle P.* Une télécommande «domotique» à infrarouges.

Radio-REF. 2, square Trudaine, F-75009 Paris. Année 1989. **N° 3.** P. 16-18. *Rousselet M.* Mesures sur relais coaxiaux – P. 19-25. *Pages R.* Emetteur CW pour débutant – P. 28-32. *Jentgès R.* La chronique du packet-radio.

RGE Revue Générale de l'Electricité SA. 48, rue de la Procession, F-75724 Paris Cedex 15. Année 1989. **N° 3.** P. 52-58. *Zeddam A., Degauque P.* Signaux induits par la foudre sur les lignes de télécommunications.

Telecoms Magazine. 60-62, rue d'Hauteville, F-75010 Paris. Année 1989. **N°. 22.** P. 14-17. *Gassot Y.* Vers une nouvelle révolution des fibres optiques – P. 25-29. *Thibert X.* Le mécano de la communication – P. 37-41. *Rohde E.* Le pari osé d'ARABSAT – P. 42-48. *Le Diberder A., Musso P.* Les réseaux vont plus vite que l'économie.

ENGLISH

Break-in. Official Journal of the New Zealand Association of Radio Transmitters, Inc., NZART Headquarters, PO Box 40-525, Upper Hutt. Year 1989. **No. 2.** P. 5-7. *Barnes T.* Tracking low earth orbit satellites at L/S band – P. 11-12. *Ingham D.* Amateur Television – 615 MHz antenna – P. 13-14. *Williams P.* An FM TV demodulator for satellite reception.

COMBROAD. Commonwealth Broadcasting Association, Broadcasting House, London W1A 1AA. Year 1989. **No. 82.** P. 1-6. TV programme exchange in Commonwealth developing countries – Is it feasible? – P. 12-13. *Newsom J.* Development of local/community radio in Australia – P. 22-25. *Lane N.* United Kingdom to New Zealand satellite delivery service.

Communications International. 100 Avenue Road, London NW3 3TP. Year 1989. **No. 3.** P. 43-49. *Galbraith M.* South Korea's olympian telecoms achievement – P. 59-64. *Stewart A.* ISDN services mature – P. 78-80. *Holker M.* Predicting propagation for radio waves.

Computer Law and Security Report (The). Solex Ltd., 31 Spring Crescent, Portswood, Southampton SO2 1FZ. Year 1989. **Issue 6.** P. 10-16. *Bigelow R. P.* Computer security, crime and privacy–US status report–P. 17-18. *Krmic N. F.* Yugoslavia: current legal protection for computer programs.

Control and Instrumentation. Morgan-Grampian House, Calderwood Street, London SE18 6QH. Year 1989. **No. 3.** P. 71-73. *Lewis G.* Mass spectrometers move on-line–P. 79-83. *Tinham B.* Getting more from your system.

ESA Journal. 8-10, rue Mario-Nikis, F-75738 Paris Cedex 15. Year 1988. **No. 4.** P. 441-453. *Agrotis L. G.* Near-earth satellite orbit determination and its applications–P. 455-465. *Otter M., Drewes G. W. J.* Meteosat ranging concept–P. 467-482. *Adamson J., Kerr G. W., Jacobs G. H. P.* Rectification quality assessment of meteosat images.

International Broadcasting. 3-5 St. John Street, London EC1 4AE. Year 1989. **No. 2.** P. 5. *Parry J.* ITU agrees new international regulations–P. 12-14. Digital audio for broadcasters: the remaining hurdles–P. 26-35. *Smith T.* Trends in television OBs.

Journal of the Franklin Institute. Benjamin Franklin Parkway, Twentieth Street, Philadelphia, PA 19103. Year 1989. **No. 2.** P. 151-166. *Peterson S. R., Yong Hoon Lee, Kassam S. A.* Spectral performance characterizations of some generalized median filters–P. 221-233. *Tung L. J.* An algorithm for stuck-at fault coverage analysis of combinational and sequential logic circuits–P. 235-245. *Mor A., Weinstein A., Gavril S.* The field distribution of a current loop placed at an arbitrary angle above the stratified ground.

Middle East Communications. Icom Publications Ltd, North House, North Street, Carshalton, Surrey SM5 2HW. Year 1989. **No. 3.** P. 14-15. *Nolan B.* ISDN and the private network–P. 23-24. Video conferencing comes of age–P. 27-30. *Parker P.* Remote camera control systems.

QST. American Radio Relay League, 225 Main Street, Newington, CT 06111. Year 1989. **No. 3.** P. 18-20. *DeMaw D.* A simple 80-meter converter–P. 29-32. *Fouts D. J.* Collinear phased antennas for the HF bands.

Radio Communication. RSGB Headquarters, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. Year 1989. **No. 3.** P. 34-38. Pre-history of amateur SSB–P. 39-40. *Preedy T.* Compact and effective HF antenna.

Satellite Communications. 1 East First Street, Duluth, MN 55802. **March 1989.** P. 12-14. *Stephens G. M.* Maritime pays the freight–P. 23-26. *Eckel K.* The niche for remote broadcasting–P. 3A-13A. Special Supplement: VSATs.

Telecom. British Telecom World, British Telecom Centre, 81 Newgate Street, London EC1A 7AJ. **March 1989.** P. 25-27. *Livingstone E.* Broader casting satellites swell TV choice.

Via Satellite. Stark Services, PO Box 17048, North Hollywood, CA 91615-9948. Year 1989. **No. 3.** P. 28-38. *Dunford K.* TSAT: a low-cost solution for satellite networking–P. 39-41. *Kinzie R. W.* Outer space: a good place to keep your communications.

SPANISH

Actualidad Electrónica. Gran Vía de les Corts Catalanes, 594, 08007 Barcelona. Año 1989. **N.º 541.** P. 3. Amper quiere ser socio de la filial europea de telecomunicaciones de ATT – P. 9. Intel estudia instalar una fábrica de chips en Europa – P. 12. El mercado electrónico chino despierta un renovado interés de las potencias occidentales.

CQ Radio Amateur. Boixareu Editores SA, Gran Vía de les Corts Catalanes, 594, 08007 Barcelona. Año 1989. **N.º 63.** P. 15-18. *Ferre J.* Radioestereofonía – P. 19-21. *Oliveira F. C.* Eficiente conversor para la banda de 6 metros –P. 22-25. *Isa J.* Antena económica para 28 MHz – P. 26-30. *Arroyo F.* Sintetizador de frecuencia de 5 a 6 MHz.

Metalurgia y Electricidad. Apartado 756, 28080 Madrid. Año 1989. **N.º 608.** P. 101-107. *García-Zayas J.* Proceso USM – P. 115-116. Tratado mundial sobre redes y servicios internacionales de telecomunicación.

Mundo Electrónico. Boixareu Editores SA, Gran Vía de les Corts Catalanes, 594, 08007 Barcelona. Año 1989. **N.º 193.** P. 56-60. *Fernández I., Arrien J. C.* Comprobación de sistemas digitales ASIC – P. 64-71. *Riu i Costa P. J., Pallás Areny R., et al.* Multiplexores analógicos: panorámica del mercado – P. 80-85. *Vitrià i Marca J., Villanueva Pipaón J. J.* Inspección visual de CI: técnicas de tratamiento de imágenes.

VídeoPopular. Trav. Les Corts, 322, 3/2, 08029 Barcelona. Año 1989. **N.º 31.** P. 32-36. *Jové Mestres J.* Astra: aumento de la oferta televisiva – P. 38-48. *Palou Martínez J.* El super VHS al descubierto – P. 50-54. *Adan Puig A.* Modificación conductual y vídeo técnica.

OTHER LANGUAGES

German

Aktuelle Technik. B + L Verlags AG. Steinwiesenstrasse 3, CH-8952 Schlieren. Jahrgang 1989. **Nr. 3.** S. 16-19. High Performance Logikanalyse – S. 24. PC-kompatibles Industrie-Computersystem auf der Basis von STEbus-(IEEE-1000-) Eurokarten-Modulen.

CQ-DL. Amateurfunk-Zentrum des DARC, Postfach 1155, Lindenallee 6, D-3507 Baunatal 1. Jahrgang 1989. **Nr. 3.** S. 156-158. *Riedel B.* Was ist ein Panoramaempfänger? Wozu wird er benutzt? – S. 159-160. *Schoch D.* Netzteil mit integrierter Sicherung.

EEE. Konradin-Verlag, Abt. vw, Postfach 10 02 52, D-7022 Leinfelden-Echterdingen. Jahrgang 1989. **Nr. 6.** S. 12-22. Optisch übertragen – S. 23-24. Die Sekunde als Mass – S. 39-43. Blechtrommel voller Daten.

Nr. 7. S. 36-37. LANs – keine geschlossene Gesellschaft – S. 46-47. Netze und Nachrichten – S. 48. Kommunikationsindustrie hat Tritt gefasst.

Elektrotechnik und Informationstechnik. Springer-Verlag, Postfach 367, A-1011 Wien. Jahrgang 1989. **Nr. 3.** S. 89-95. *Herter E.* Probleme des Teilnehmeranschlusses in diensteintegrierenden Nachrichtennetzen – P. 100-106. *Lampey H., Schäfer H.* Ein Beispiel zum Einfluss der Bauform auf die statische Streufeldstruktur von Elektroblechen aus Silizium-Eisen: Der M-Schnitt.

Elektronik Informationen. AT-Fachverlag GmbH, Postfach 50 01 80, D-7000 Stuttgart 50. Jahrgang 1989. **Nr. 3.** S. 48-50. *Fernandez M. A.* Analysesoftware zur mathematischen Messdatenauswertung auf PC-Basis – S. 62-66. *Hess T.* Hochauflösende AD-Umsetzer mit Abtastraten im MHz-Bereich.

ETZ. Elektrotechnische Zeitschrift. Merianstrasse 29, D-6050 Offenbach a.M. Jahrgang 1989. **Heft 5.** S. 206-214. *Bieniek K.* Elektronische Drehzahlverstellung zur Regelung der Förderleistung von Kreiselpumpen – S. 216-220. *Falk K.* Das Kühlsystem – Wesentlicher Faktor zur Optimierung elektrischer Antriebe – S. 230-236. *Flottemesch J., Grüneberg J.* Experimentiersysteme für drehzahlveränderbare Antriebe.

Funk. Verlag für Technik und Handwerk GmbH, Postfach 1128, D-7570 Baden-Baden. Jahrgang 1989. **Heft 3.** S. 22-29. *Niefind R.* Das Funkwetter per Telefon – S. 34-37. Was ist Antennen-gewinn?

Messen Prüfen Automatisieren. Hans Holzmann Verlag GmbH & Co KG, Postfach 1342 und 1343, D-8939 Bad Wörishofen. Jahrgang 1989. **Nr. 3.** S. 105-111. *Rafferseder A.* Incircuit-test – S. 115-119. *Teodorescu D.* Messdatenerfassung in systemen mit dezentraler struktur – S. 120-123. *Langer H., Erfkamp K.-D.* Schwingfestigkeitsprüfung mit vertikalem Schwingtisch.

Nachrichtentechnik Elektronik. VEB Verlag Technik, Oranienburger Strasse 13-14, DDR-1020 Berlin. Jahrgang 1989. **Nr. 3.** S. 92-96. *Fechner R.* Stand und Perspektiven des Einsatzes von Lichtwellenleiter - Nachrichtenübertragungsanlagen im Netz der Deutschen Post – S. 96-98. *Mittasch C.* FDDI – ein Hochgeschwindigkeits-LAN mit Lichtwellenleitern – S. 100-102. *Von Raemdonck R.* Entwicklungsrichtungen in der leitungsgebundenen niederkanaligen digitalen übertragungstechnik.

RadioWelt. Verlag Wolfgang Scheunemann, Bonner Str. 328, D-5000 Köln 51. Jahrgang 1989. **Nr. 3.** S. 4-7. *May J.* VoA-Europe: «Radio ist ein lokales Medium» – S. 10-12. *Marten M.* Doppeljubiläum beim deutschen Satellitenfunk: 25 Jahre Raisting – 10 Jahre Usingen.

Unterrichtsblätter der Deutschen Bundespost. Felnmeldewesen, Postfach 30 05 55, D-2000 Hamburg 36. Jahrgang 1989. **Nr. 3.** S. 67-83. *Sös E.* Das digitale Vermittlungssystem S 12 – S. 91-95. *Höhn U.* Das Richtfunk-Funkfeld.

ZPF. Zeitschrift für das Post- und Fernmeldewesen, Postfach 8001, D-5300 Bonn 1. Jahrgang 1989. **Nr. 3.** S. 18-19. *Schröther E.* Das Aus für die Telefonhäuschen? – S. 37-41. *Stern H.* Eine echte Wachstumsbranche – S. 45-53. *Butz G., Wöhlbier G.* Fit mit dem «Konzept ÜNetz».

Italian

Elettrotecnica (L'). AEI, 259 Viale Monza, I-20126 Milano. Anno 1989. **N. 2.** P. 135-138. *Triulzi R., Garzenini L.* ENELTEL: un servizio in tempo reale per l'utenza – P. 139-146. Trasporti e telecomunicazioni: grandi mutamenti in vista.

Millecanali. Via G. Parini 9, I-20121 Milano. Anno 1989. **N. 167.** P. 78-81. La regolamentazione radio TV negli USA – P. 90-105. *Calabrese D.* I ponti radio – P. 106-107. Guida pratica alla comunicazione in dB tra il tecnico e il suo capo.

Radio Rivista. Associazione Radioamatori Italiani, Via Scarlatti 31, I-20124 Milano. Anno 1989. **N. 3.** P. 37-38. *Fusari L., Moroni P.* Come realizzare un'antenna lunga per il portatile dei 144 MHz.

Rassegna Postelegrafonica. Via Lucca 19-21, I-00161 Roma. Anno 1989. **N. 2.** P. 35. *Platek G. M.* Problemi e programmi della TV da satellite "Made in Europa" – P. 36-37. Che fibra quel telefono.

MULTILINGUAL

Bulletin SEV-VSE – Bulletin ASE-UCS. Edenstrasse 20, Postfach 229, CH-8021 Zürich. Jahrgang 1989. **Nr. 6.** S. 307-313. *Jacot M.* La politique de l'énergie – un élément de la stratégie des entreprises – S. 319-321. *Blum W., Bussmann W.* Energieverbrauch des Tages-Anzeigers im Spiegel der wirtschaftlichen Entwicklung – S. 335-340. Optimisation économique de l'approvisionnement en électricité grâce à l'influence des entreprises d'électricité sur la courbe de charge.

Frequenz. Fachverlag Schiele und Schön GmbH, Markgrafenstrasse 11, D-1000 Berlin 61. Jahrgang 1989. **Nr. 2.** S. 42-46. *Hartl P., Thiel K.-H., Qinling Liang.* Demodulation of spread-spectrum signals using one SAW convolver.

Output. Offizielles Organ der Schweizerischen Vereinigung für Datenverarbeitung (SVD), Zürich. Fachpresse Goldach, Hudson & Co., CH-9403 Goldach. Jahrgang 1989. **Nr. 3.** S. 27-31. *Jaquier J.-J.* Die Dienstleistungen der PTT im Teleinformatikbereich – S. 33-43. *Mahkorn S.* COBOL85 up to date! – S. 45-48. *Halter N.* Strategisches Management für EDV-Unternehmen.

Revue Aerospatiale. 19, boulevard du Parc, F-92200 Neuilly-sur-Seine. Année 1989. **N° 57.** P. 22-23. Ariane 4: 50 launchers for the 1990s (Ariane 4: 50 lanceurs pour les années 90) – P. 26-29. Microgravity: into space with the Caravelle (Microgravité dans l'espace en caravelle...) – P. 30-33. ARABSAT: a community link (ARABSAT: un lien communautaire).

Transnational Associations-Associations Transnationales. Union des Associations Internationales, 40, rue Washington, B-1050 Bruxelles. Year 1989. **No. 1.** P. 2-12. *Campbell P.* Management development and development management for voluntary organisations – P. 13-15. *Yates I.* Delivery of management services and training – P. 22-28. *Willot P.* (S')évaluer formation à l'(auto)évaluation.

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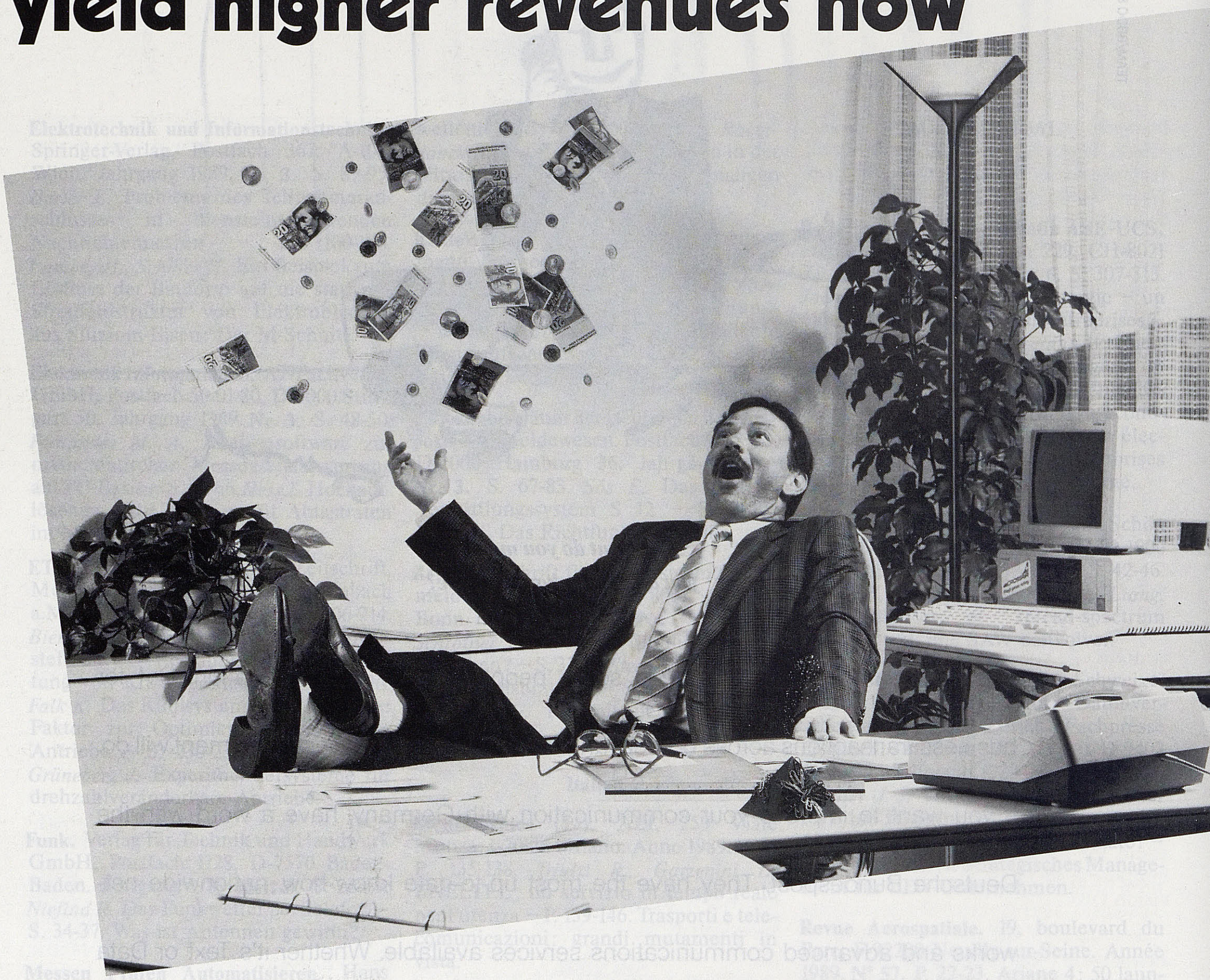

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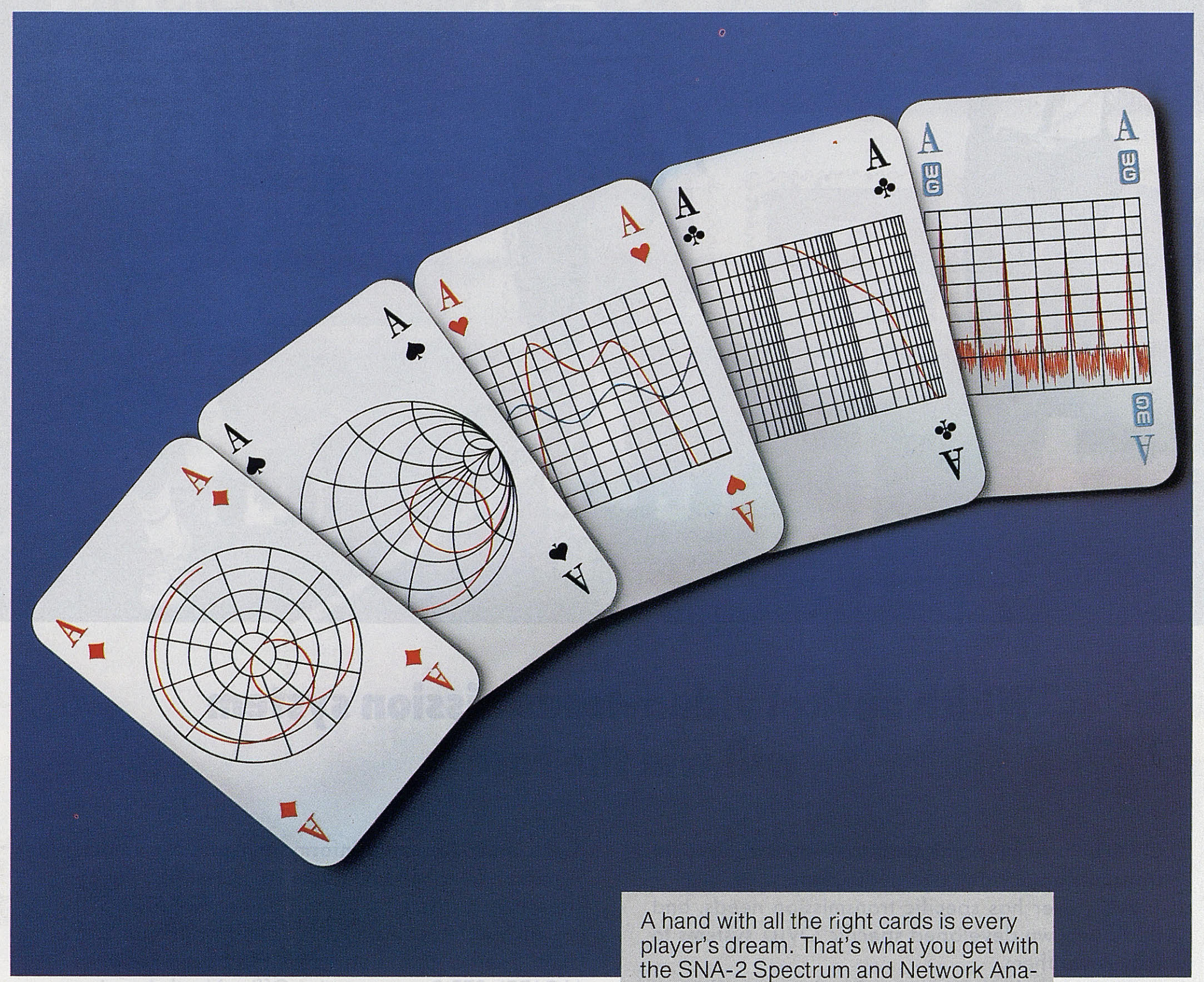

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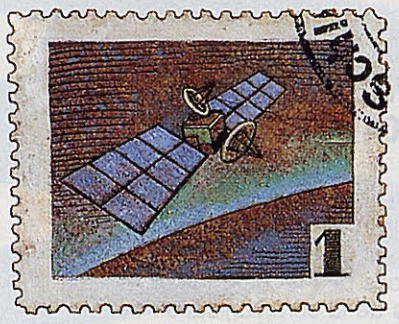

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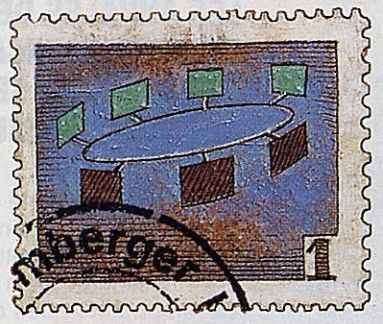

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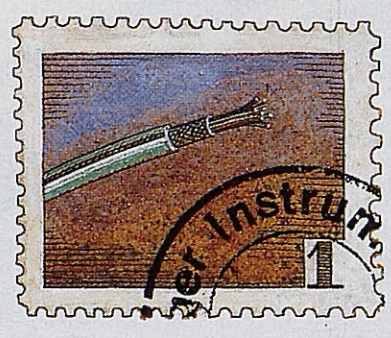

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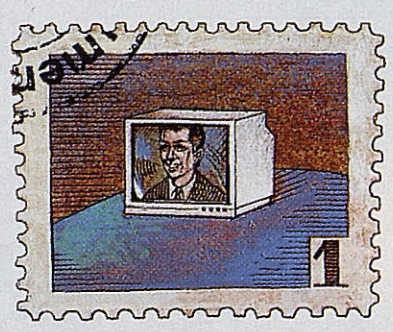

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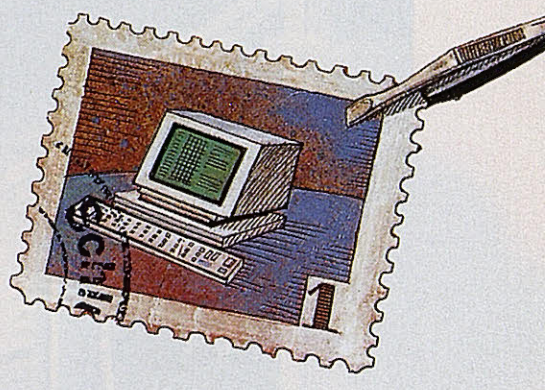

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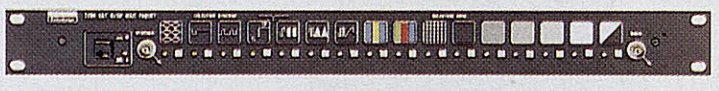

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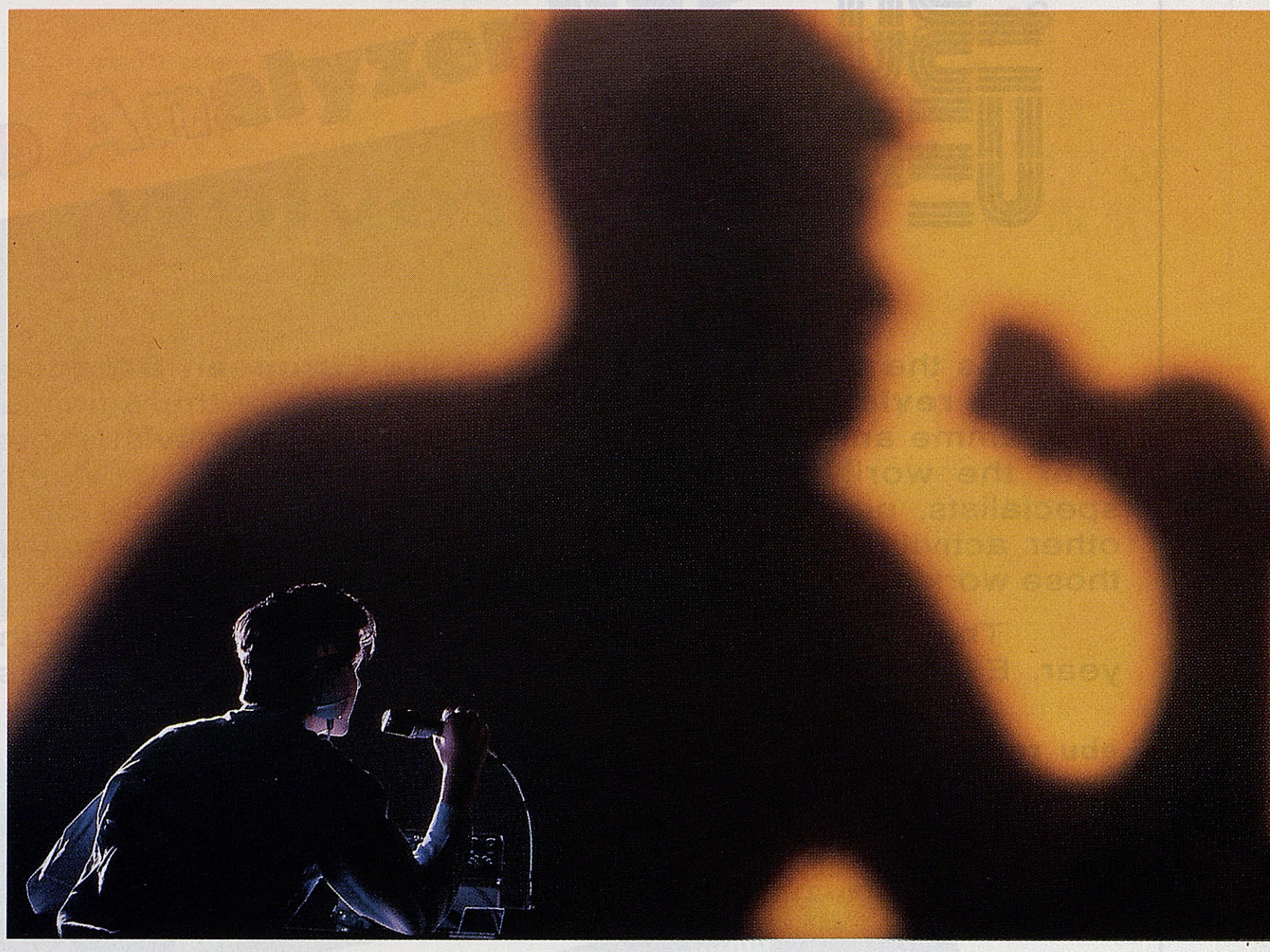

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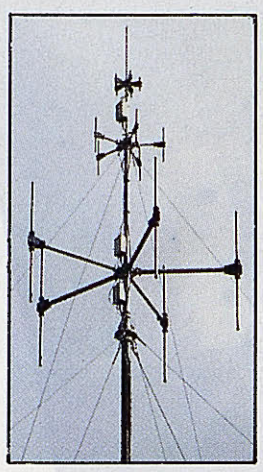

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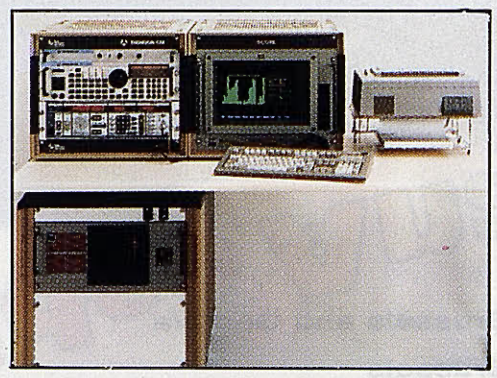

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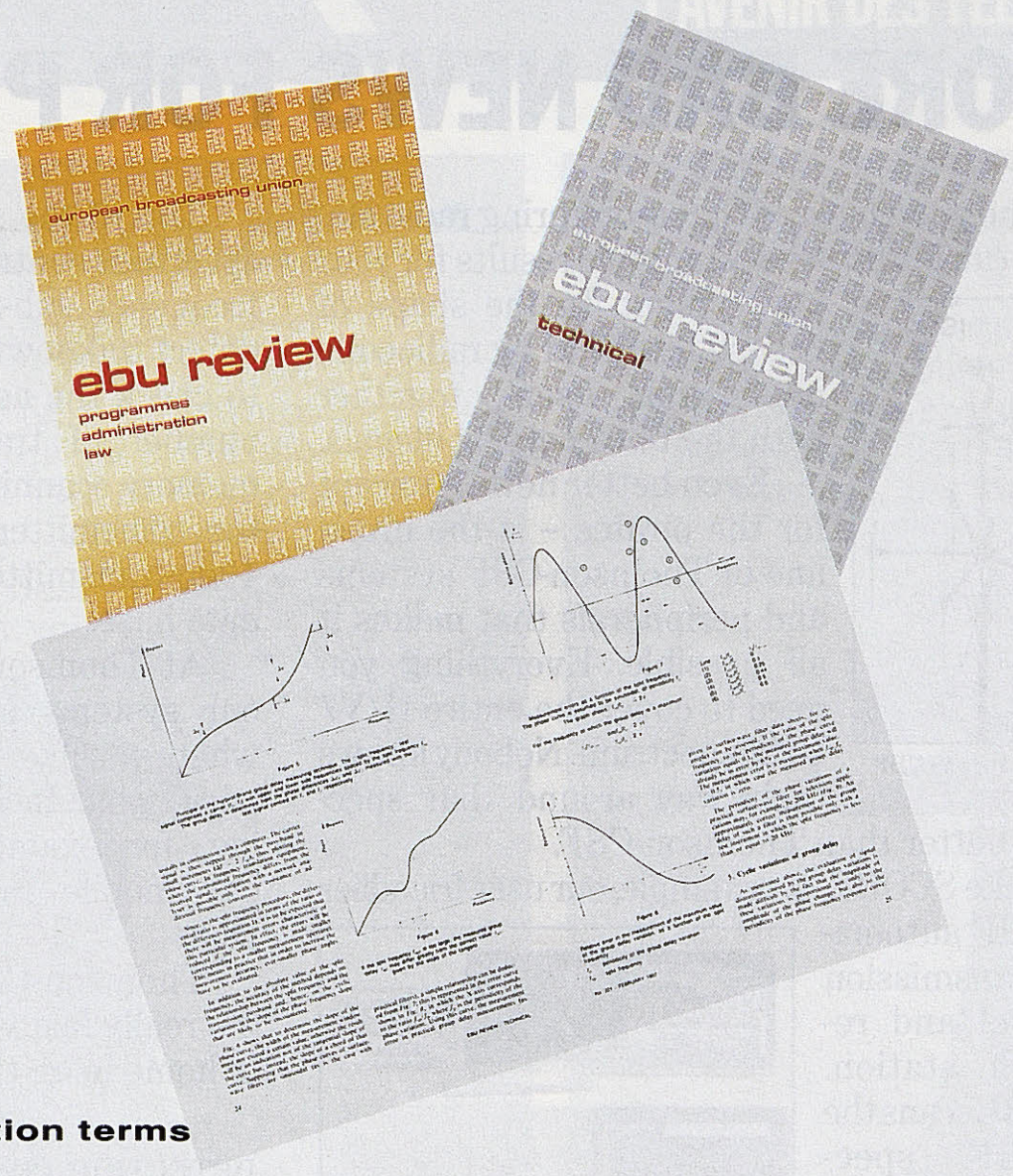

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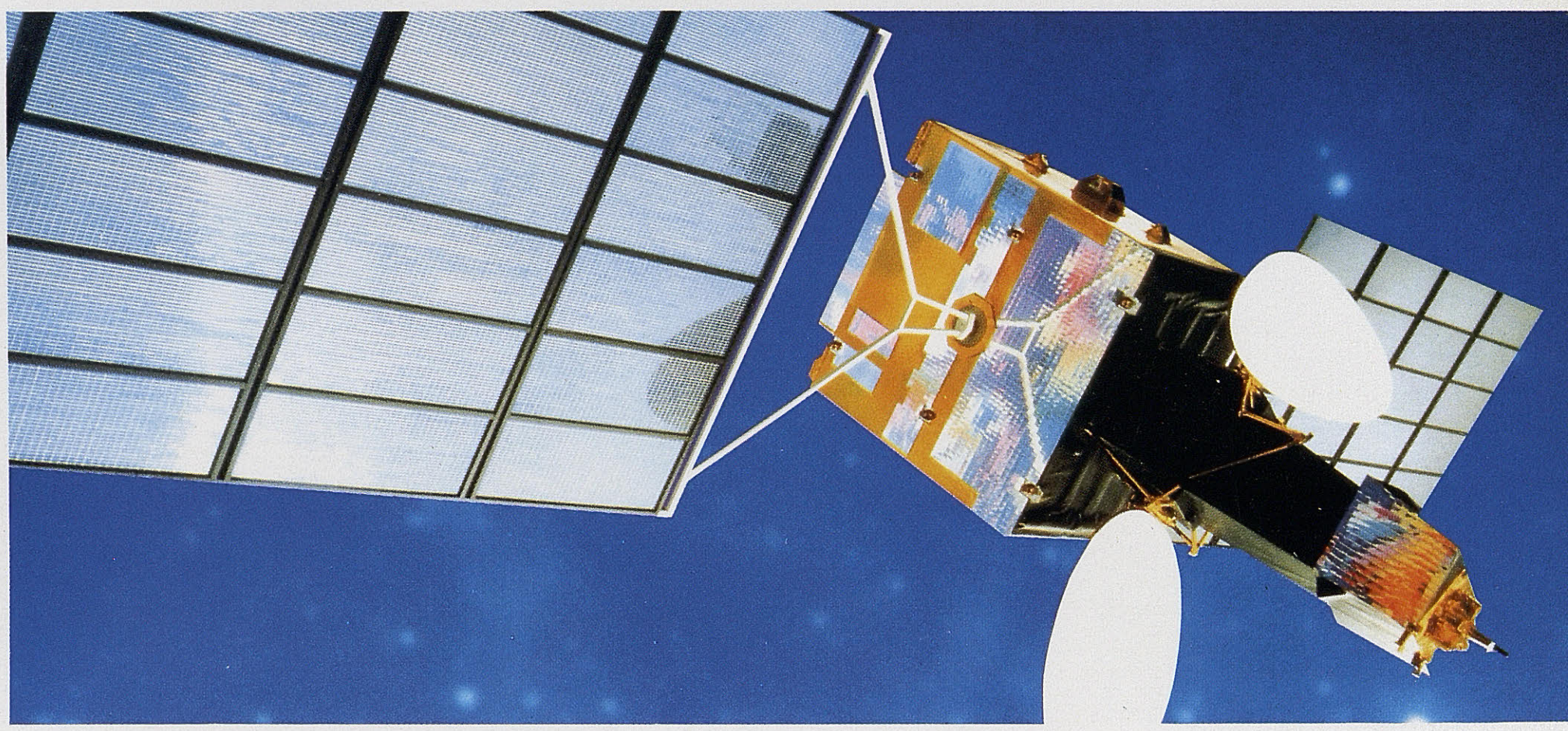

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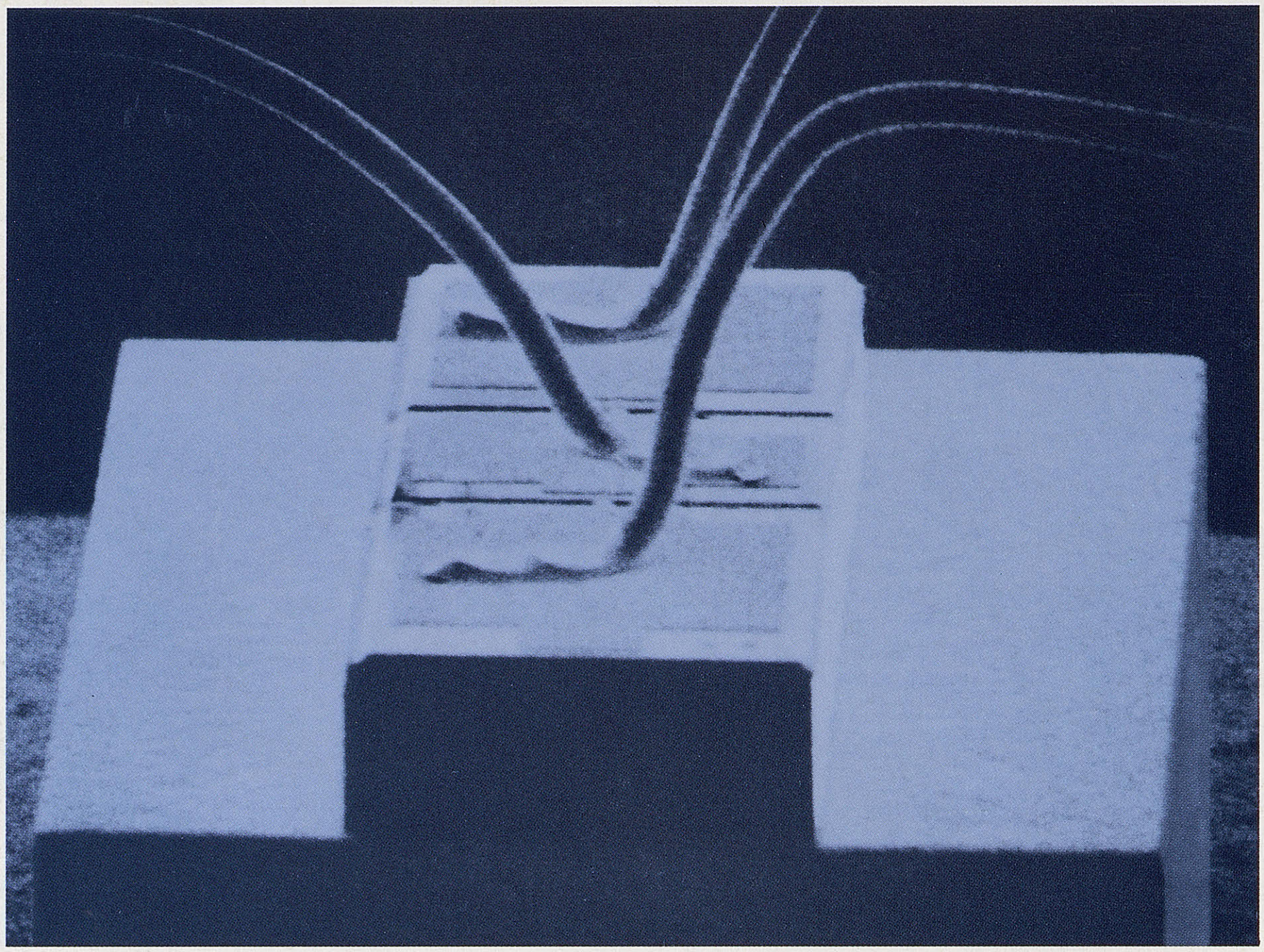

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